TE 1961-62 FIFTY CENTS

The Farm QUARTERLY

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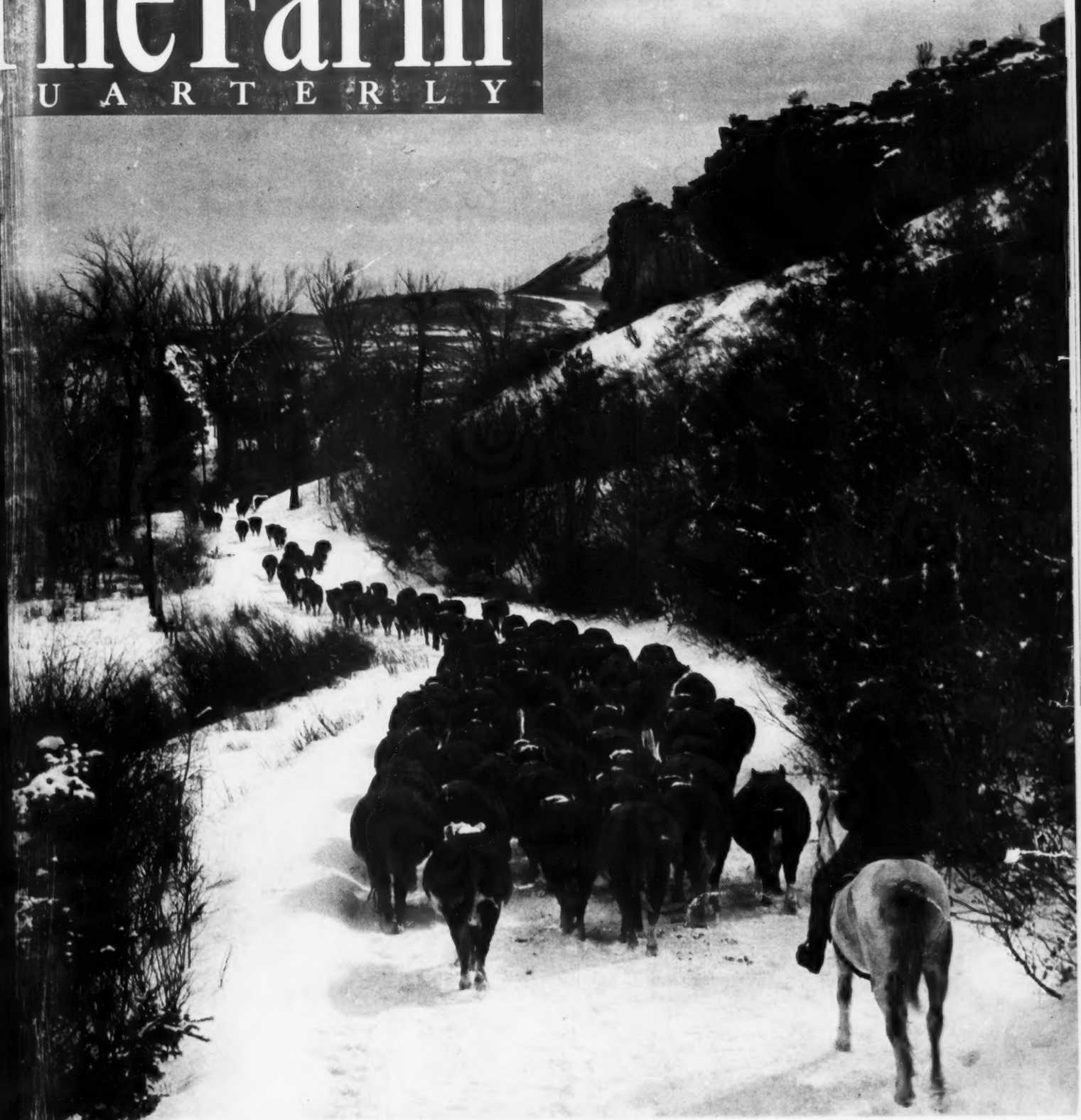

Electronic farm bookkeeping
How to make a profit from manure
Automatic controls for mechanized farms

How to squeeze more Dollars out of each tractor day

Get-ready time — minutes quick. Space tractor wheels with ease for the day's work. Roll-shift front axle — as well as power-shift rear wheels — saves time, temper and muscle. Then latch on to the implement as quickly as saying "SNAP-COUPLER hitch" — with either single-point or 3-point implements. Less get-ready time means more dollar-earning field time.

Traction that's always on tap as you need it. Simply set the lever and, as the load changes, the gauge tells you what your TRACTION BOOSTER system is doing. TRACTION BOOSTER system transfers weight of implements (mounted or pull-type) to tractor drive wheels automatically. You get the continuous ground grip that keeps tractor earnings piling up, not slipping away.

Power control that makes most of both horsepower and time. With Power Director lever, the tractor ground speed can be matched to the load or condition with on-the-go shifting between high and low range — stepping up pull power as much as 42 percent in low range, increasing speed up to 42 percent in high range. Power Director also provides live PTO.

SNAP-COUPLER and TRACTION BOOSTER are Allis-Chalmers trademarks.

Take This Seat and See the Dollar-Making Difference

FINANCE FOR PROFIT
New, Modern Equipment PAYS
Ask your dealer about our Time Payment Plans

ALLIS-CHALMERS, FARM EQUIPMENT DIVISION,
MILWAUKEE 1, WISCONSIN

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HOME READING

GOODYEAR

"EXTRA HAND" SERVICE AT WORK:

"That free 'loaner' kept 8 men from being held up 2 to 3 hours"

says Ray Baxter of Grand Island, Nebraska

A TRACTOR TIRE BLOWOUT AT 10:30 A.M. means a half day's holdup at many farms. But this was corn-picking time, so Ray Baxter immediately radio-phoned his Goodyear dealer right from the field.

S O S CALLS LIKE THIS GET TOP PRIORITY from Lloyd Egbert, vice president of G. I. Tire Sales, Inc., in Grand Island. He always has a service truck ready with everything needed to service custom-ers right where the trouble occurred.

QUICKLY INSTALLING THE "LOANER" that's always supplied when a tire can't be repaired on the spot, G. I. Tire's experts had Baxter's tractor back on the job just 45 minutes after the blowout. His badly damaged tire was taken into the shop for an expert section repair without any need to rush the job. "If it hadn't been for that 'loaner,' the 8 pickers working with that tractor would have been held up at least 2 to 3 hours," says Baxter.

WHEN YOUR TIME IS MONEY, it will pay you, too, to call for "Extra Hand" service. That not only gives you expert help—fast—in emergencies, but it puts your equipment on tougher, more trouble-free Sure-Grip Tractor Tires.

So why gamble? Next time, solve any kind of tire problem with a call to your Goodyear dealer! Goodyear, Farm Tire Department, Akron 16, Ohio.

Sure-Grip—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR "EXTRA HAND" FARM TIRE SERVICE

1 Check, change and repair any type tire.
2 Furnish free "loaners" while your tires are being repaired or retreaded.
3 Liquid-weight your tractor tires for maximum traction.
4 Minimize down time through expert help on tire maintenance.
5 Take care of your battery needs.

Lots of good things come from

GOODYEAR

MORE FARMERS PREFER GOODYEAR TRACTOR TIRES THAN ANY OTHER KIND

Choose either the popular 3-T Sure-Grip or extra-quality Traction Sure-Grip tires, both out-in-front performers

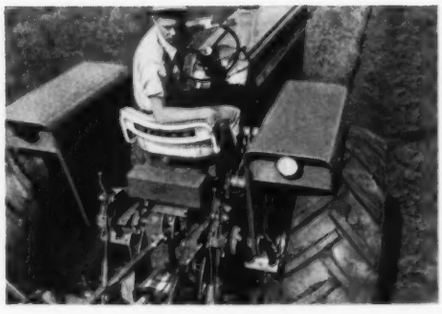
OLIVER 1800 outpulls 'em all . . . yet uses the least fuel

This powerful Oliver gasoline Row-Crop® outpulled every tractor in its class in nationally recognized tests—*by as much as 51%*. And, the diesel model pulled up to *57% more*—11,040 pounds on the drawbar.

The 1800's high draft comes from perfect balance—more than 4 tons of live, built-in weight matched to brisk, 6-cylinder power. It takes a full, firm grip—moves downfield surely and smoothly with the biggest load. Your 1800 doesn't just sit, spinning its land wheel and getting nowhere. No needless tire wear—no fuel wasted.

No—no fuel wasted! That's why the 1800 set an *all-time high* in gasoline economy in the same official trials. Then came proof of its thriftiness and performance on the farm. Pulling a 6-bottom, semi-mounted No. 5540 moldboard in third gear at 4.17 m.p.h., this stout Oliver 1800 plowed 3.38 acres of heavy silt loam 7 inches deep in one hour—at a fuel cost of 29½¢ per acre.*

Plow a round or two with this great combination the first chance you get. Your neighborhood Oliver dealer will be glad to demonstrate on *your* farm. Oliver Corporation, Chicago 6, Illinois.



Every convenience! Solid comfort! A pleasure to drive! Power steering. Draft-sensitive, 3-point hitch. On-the-go control of working depth with exclusive "Hydra-lectric" remote cylinders. Finger-tip gearshift. Dual-speed PTO.

Step into a new era of farm efficiency with an Oliver 1800—and expandable Oliver implements that utilize its greater pulling power. Plows up to 6 bottoms, Twin Hitch disc harrows up to 24 feet, chisel plows to 20 feet, cultivators to 8 rows.

The sooner you trade the more you'll save, 6% bonus on down payment and/or trade 'til use date

*Based on U.S. average cost to farmer of 19c per gallon.

OLIVER

Look for this sign, new symbol of prompt, dependable service and genuine Oliver parts.

The Farm QUARTERLY

Winter 1961-62, Vol. 16, No. 4

COMING IN SPRING

Farmers Who Beat the Machine, a group of Kentucky farmers who won a farm management contest with an electronic computer—they managed their own farms better than the machines; *Tractors of Tomorrow,* the insides of the most advanced experimental tractors of today, with some of the engineers' dreams for tomorrow; *Hot Hog Management,* the breeding, finishing and marketing methods of one of the best hogmen in Missouri; *Continuous Corn Tips,* some of the problems of a solid corn rotation, and how to solve them; *Corn Without Cultivation,* the latest in minimum tillage; a complete FQ section on *California,* the number one agricultural state—with stories on *Big Herd Dairying,* the *Mechanization of Fruit and Vegetable Harvests, Rice Growing* with Machines and Plastic, *Credit Arranging, The New Feedlot,* and most of all, *Irrigation.* The latest and the best ideas of the most progressive farmers of this inventive group will be clearly described, analyzed, and photographed to let you decide if they are applicable to your farm.

What's New in Farm Equipment, the first of a series of surveys of the latest models and inventions in machinery, with photos and analysis; the *Story of Lavoisier,* One of the Great Men of Agriculture; and the fascinating tale of a rancher's wife who paints on sandpaper, with a look at her paintings; the *Texas Rotating Range,* a simple plan to encourage desirable grasses which has increased carrying capacity by 25 to 35 per cent—these are some of the stories in Spring Farm Quarterly.

THE FARM QUARTERLY

FRED B. KNOOP, *Publisher* GRANT G. CANNON, *Editor*

Charles R. Koch, *Managing Editor;* John J. MacCallum, *Associate Editor;* Chester Charles, *Research Editor;* Fred Eichenberger, *Art Editor;* Hilda Carberry, *Editorial Secretary;* Stewart Kent, *Production Manager;* Jack McCain, *Circulation Director;* Harry Dunnohew, *Advertising Manager;* Carol Vedder, *Contract Manager;* W. P. Coleman, *Subscription Manager;* James Rosenthal, *General Manager.*

THE FARM'S PICTURES

Cover by Grant Heilman

6/Dunbar Kapple Co.; LML Engineering and Mfg. Co.; Schulte Red Line Co. 46/Joseph E. Hutchison. 54-57/Norman Reeder. 58-59/Drawings, Fred Eichenberger. 61/Kazik Pazovski. 63/Fred Knoop. 64/Kazik Pazovski. 65/Kazik Pazovski; Fred Knoop. 66/A. Ragsdale, FPG. 67/R. J. McGinnis. 68-69/Grant Heilman (color); F. H. Theakston, John A. Underwood. 71/Drawing, Fred Eichenberger. 72/Kazik Pazovski. 74/Fred Knoop. 75-77Grant Cannon. 78-81/Kazik Pazovski. 91/Courtesy Bibliotheque Publique et Universitaire, Geneva. 92/Courtesy IBM. 93/Charles R. Koch. 94-97/Joe Munroe. 100-101/Charles R. Koch. 102/Kazik Pazovski. 170/SideKick Sales Company; Ron Fowler.

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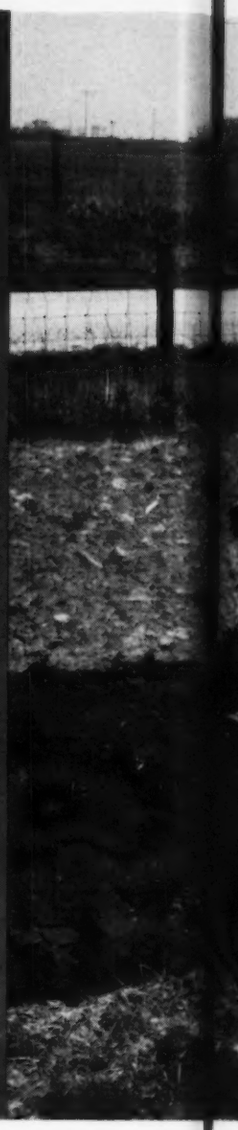
The Cover Picture: Howard Talbert, a southwestern Colorado rancher, drives his herd of Hereford cows from their summer pasture on the mountain to the home place near Ridgeway for winter feeding and calving.

Could this be YOUR ad?

HELP WANTED

Experienced partner for row-crop farm. Must be young and strong, easy to work with, able to do ALL jobs FAST...and have practical farm experience.



If so, you need a new

JOHN DEERE TRACTOR

New John Deere Tractors will definitely help eliminate "short handedness" on your farm. These modern tractors *encourage* faster working speeds that make the most out of every field hour. And at these faster speeds, you'll discover your per-acre cost of operation is held to a minimum. Your own capacity for work is greatly increased also by the new standard of comfort and convenience designed into these new models. It's a combination that spells out work completed on schedule . . . and profit dollars in the bank.

Fully Field Proved

Your new John Deere Tractor is no "babe in the woods." It has been performance-proved on every type and size of operation that makes up the business of farming. It has demonstrated versatility and practicability for the large and small jobs alike and handled both types with efficiency and a regard for quality work which pleases even the most critical operator.

Owners Speak Up

Tractor history has been made by John Deere New Generation Tractors in their first full season in the field, and none are so aptly qualified to testify to their performance as are the owners:

"When the new John Deere Tractors came out, I traded for a "3010." I'm glad I did. With that variable-speed engine, it's my best all-around tractor for making hay, planting, cultivating, and my heavy work. I figure it's the best operating equipment I could use." —T. L. Macon, Wetumpka, Alabama

"I never rode as comfortable a tractor. When you go home, you don't have to head for the easy chair—you haven't got one as easy as on the "2010." The platform is a big improvement—gives you room to move about." —Lloyd Arnett, Oakdale, California

"Our dealer brought a "4010" out and left it. He figured once we got a taste of the "4010," we'd keep it—and he was right. We've got a new 5-bottom 16-inch plow and the "4010" handles it with just no effort at all. There's no need to change gears back and forth because nothing will stop the "4010" Tractor." —Willard and Wendell Babcock, Jeddo, Michigan

Make your partner a quality-built John Deere Tractor. The liberal John Deere Credit Plan makes financing easier for you. See your John Deere dealer.

JOHN DEERE design, dependa

You'll work more acres per day with big equipment—get high efficiency on heavy loads or light with the "4010."

3 ROW-CROP MODELS

45 h.p. "2010" . . . 55 h.p. "3010" . . . 80 h.p. "4010" all give you fast working speeds and efficiency for light work or heavy—with multi-speed Syncro-Range Transmissions and Variable Horsepower engines—gas, Diesel, or LP-Gas. Optional front ends and adjustable rear wheels suit your needs exactly. Use all types of equipment for every row-crop job.

3 ROW-CROP UTILITIES

35 h.p. "1010" . . . 45 h.p. "2010" . . . 55 h.p. "3010" are compact, low built, extremely stable in every operating condition. They team up with a wide range of drawn, pickup, and PTO equipment; handle front-mounted cultivators with plenty of clearance. Wide range of wheel treads. Gas and Diesel engines for all power sizes; LP-Gas in the "2010" and "3010."

Here's the compact, hustling "2010" Row-Crop Utility with 35 Loader.

SEND FOR FREE LITERATURE

John Deere • 3300 River Drive • Moline, Ill.

Please send more information on these tractors:

☐ 1010 Row-Crop Utility ☐ 2010 Row-Crop
☐ 2010 Row-Crop Utility ☐ 3010 Row-Crop
☐ 3010 Row-Crop Utility ☐ 4010 Row-Crop

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Rural Route_____ Box_____

Town_____ State_____

JOHN DEERE

nd and dealers MAKE THE DIFFERENCE

To Begin With

Corn in a Plastic Sack

Field tests of a new method of grain storage have been underway near Chicago for the last year. The 14 percent moisture corn is stored in giant vinyl plastic bags lying on the ground, and kept under slightly reduced pressure by a small fan to hold the bag snugly to the pile of grain. B. F. Goodrich makes the bag; Dunbar Kapple Co., Batavia, Illinois, makes the Vac-U-Vator, a pneumatic grain-handling machine that blows the grain into the bag. The same machine, with the blower reversed, pulls the air from the bag to keep the stored grain in a slight vacuum. The bag is laid on the ground, with no preparation except leveling or smoothing with sand. The tests are to show the bag's operation when exposed to weather and rodents. The 25,000-bushel bag under test is 100 feet long, and weighs 600 pounds empty. B. F. Goodrich can provide these sausages from 5,000 to 50,000-bushel capacity.

The big casings are inflated for emptying, then unloaded by the same Vac-U-Vator and sealed between periods of emptying, if it is not emptied all at once. If the air in the bag were replaced with carbon dioxide or nitrogen, or if even most of the oxygen were removed, the bag would behave much like a sealed silo—wet grain storage would be possible. The manufacturers believe the bags will store grain at five cents a bushel. They are available from Dunbar Kapple, Vac-U-Vator Division, Batavia, Illinois.

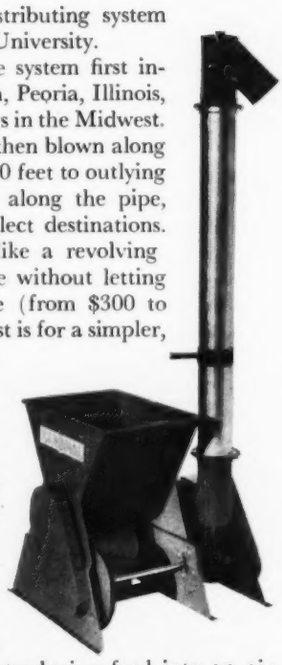
Right-Angle Augers

Two different types of force-fed augers appear in the Low Cost Grain Handling article on page 78. A third type is being introduced by the LML Engineering and Mfg. Co., Columbia City, Indiana. This latest type uses a length of horizontal auger to feed a vertical auger, giving us a third method of increasing the capacity of the vertical auger. The LML force-fed, six-inch auger will handle between two and three times the feed of a simple vertical auger of the same size.

The basic unit is a two-bushel hopper with the horizontal auger in the bottom. This feeds into the vertical auger just outside the hopper. Both augers are driven by one motor. The horsepower —from one to five—varies with height and rate of discharge and with the characteristics of the feed. The 12-foot high base unit costs $367, less motor, and extra 10-foot sections are $45.95.

Right-angled augers figured in a rather different application in agricultural engineering research at the University of Illinois. Hoyle Puckett and Hershel Kleuter, of the Farm Electrification Research Branch, USDA, this summer were designing an improvement in the one-inch pipe feed distributing system (FQ Summer '59), designed at the University.

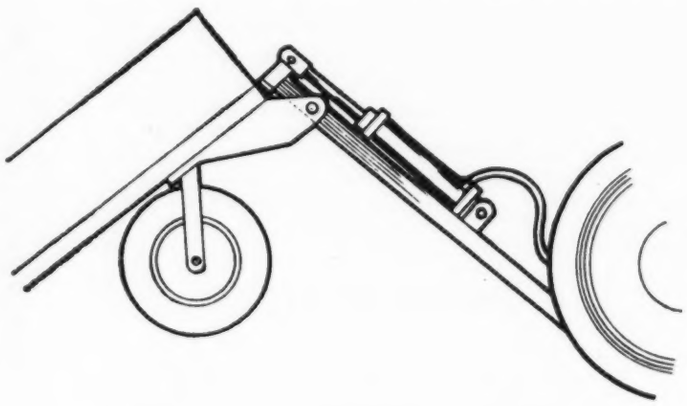
A small unit of this one-inch pipe system first installed on Warren Frye's poultry farm, Peoria, Illinois, has been demonstrated at several shows in the Midwest. At Frye's, feed is ground and mixed, then blown along one-inch piping for distances up to 500 feet to outlying poultry houses. Air blows the feed along the pipe, and air valves, remotely operated, select destinations.



At present a vane valve, rather like a revolving door, introduces the feed to the pipe without letting air escape. This device is expensive (from $300 to $1,000), and the Puckett-Kleuter quest is for a simpler, cheaper method. They tried a single vertical auger, but the air blew down the auger when it was started empty, preventing it from picking up feed. However, they found the two augers worked fine—one vertical, the other horizontal. The flat auger feeds the vertical auger. A single horizontal auger won't work; the vertical auger is necessary as, when full of feed, it seals itself under pressure. By all appearances, the combination of augers will provide a low-cost method of introducing feed into an airstream. They know it will work on the one-inch pipe—but perhaps it will be adaptable to other systems handling ground feed or small grains.

Humps and Crazy Wheels

One of the most inventive pieces of equipment at the Farm-Orama, held at Wilmington, Ohio, was a wagon made by the Schulte Red Line Company, 715 South Front St., Quincy, Illinois. The model on display was a four-wheel dumping wagon called the Back-King. What made it different is the way it steers and the way it dumps. The tongue is fixed to the chassis of the wagon in such a way that it won't turn, but does flex up and down. The front wheels are crazy wheels—so, when backing, the rig behaves like a two-wheeler. But best of all, it humps its back to dump.



There is a hydraulic cylinder on the tongue that jackknifes the tongue and the chassis of the wagon. The wagon's front wheels lift, and the wagon is supported on the rear wheels and the hitch point on the tractor. You can also use this position to get increased traction—putting some of the wagon's weight on the tractor. This wagon has eliminated the expensive steering mechanisms and the double chassis usual on a dump wagon, with crazy wheels and a dump like the arched back of a spitting cat. It retails for around $550 and can be bought from the Quincy firm or local dealers.

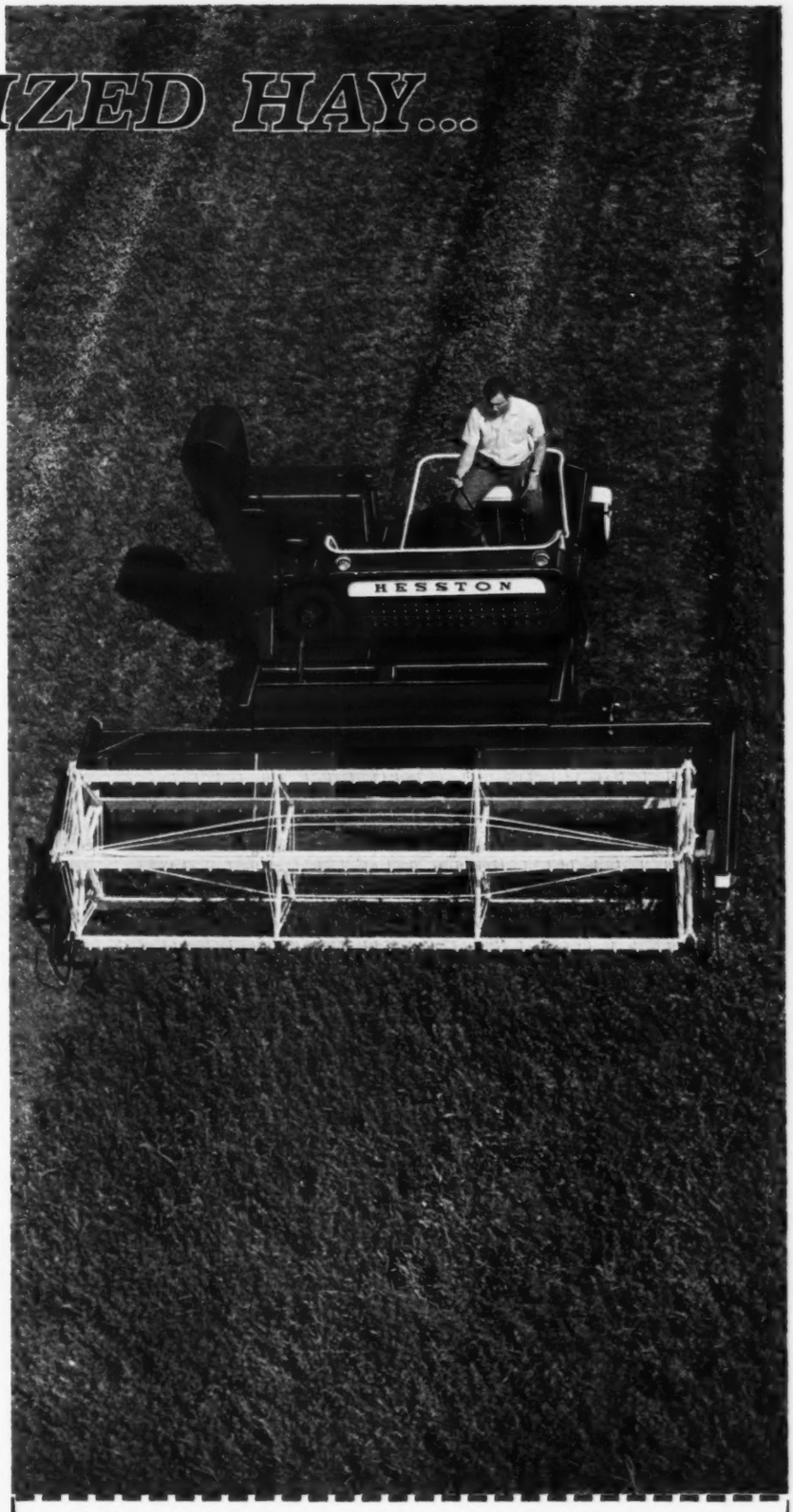
HESSTONIZED HAY...

What is it?
Why is this hay worth more?
How do you get it?

"Hesstonized Hay" is premium quality hay — loaded with protein, carbohydrates, minerals, and vitamins — that is harvested through the **exclusive** cutting, conditioning, and windrowing action of the Hesston Windrower-Conditioner . . . the machine that first introduced this process to the industry. The men who grow, feed, and buy it call it "Hesstonized" because it's so uniquely different from any other type of hay.

"Hesstonized Hay" is worth more because it puts top gains on feeder stock and gets bonus production from dairy herds. Many buyers specify it . . . pay premium prices for it. "Hesstonized Hay" retains tender, nutritious tips and leaves . . . minimizes leaching and bleaching . . . increases dry weight yield as much as 23.4% compared to mowed and raked hay.* No matter whether you harvest 70 or 7,000 acres of hay — for bales, silage, mow-loft- batch-drying, or dehydrating — you'll find yourself making bigger and better profits with "Hesstonized Hay."

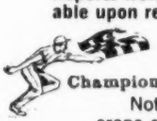
Not just any windrower-conditioner can produce "Hesstonized Hay." **The secret is the way the Hesston conditions the hay and "builds" the windrow.** The Hesston cuts the crop fast and clean and delivers it to the hay conditioner. The conditioner gently "squeezes" the stems every two inches so moisture filters out quickly but valuable nutrients are retained. It is then "built" into airy, fluffy windrows by the Hesston's uncomparable windrow control for fast curing into greener, leafier, and more palatable hay . . . **Hesstonized!**



The New
HESSTON 260
WINDROWER-CONDITIONER

With more Hesston's working in the nation's hay fields than all others combined, why take a chance on a "second-best"? Now, you can get the greatest champion of them all — the new Hesston 260! All of the proven-performance "firsts" of other Hesston machines — from One-Hand Trim Steering and patented, V-belt transmission to detachable hay conditioner — are supplemented by new better-than-ever header flotation . . . 250% stronger lift arms . . . heavier-duty frame . . . one-hand draper adjustment . . . increased sickle stroke and beautiful functional styling. **Diesel power is also available for the first time!** This is the machine that saves you 293 miles field travel in 100 acres of hay . . . reduces your equipment, operating and labor costs from 50% to 75% . . . and gives you "Hesstonized Hay" for maximum profits!

*** Reports from users and agricultural colleges available upon request.**



Champion of the Field!
Not only for hay, but for windrowing other crops such as wheat, barley, rye, seed crops, peas, beans, lentils, mint, safflower, and a whole range of grasses . . .

there's still nothing like a Hesston!

HESSTON Manufacturing Company, Inc.
495 KING STREET / HESSTON, KANSAS

Please send me free booklet on "Hesstonized Hay" and literature on the Hesston 260 Windrower-Conditioner.
I am a farmer dealer student

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ADDRESS _____

TOWN _____ STATE _____

HS/ 16-961

USE NEW FIRESTONE TIRES FREE

and end tractor tire downtime!

With Firestone's FREE NEW TRACTOR TIRE LOANER SERVICE you simply don't lose valuable field time with tire troubles. Nor do you have to put up with fuel-eating wheel slippage due to worn tires waiting for a slack work period to get tires in for retreads.

Just call your Firestone Dealer or Store and, regardless of the brand of tire you are now using, Firestone will put on a new (that's right, NEW) pair of Firestone rear tractor tires, right in the field if necessary, to keep your tractor working while Firestone repairs or retreads your old tires. You can use FREE the only tractor tires built with exclusive, long wearing Firestone *Rubber-XF*, *Shock-Fortified* cord bodies and *Flex-Fortified* sidewalls. No obligation, of course.

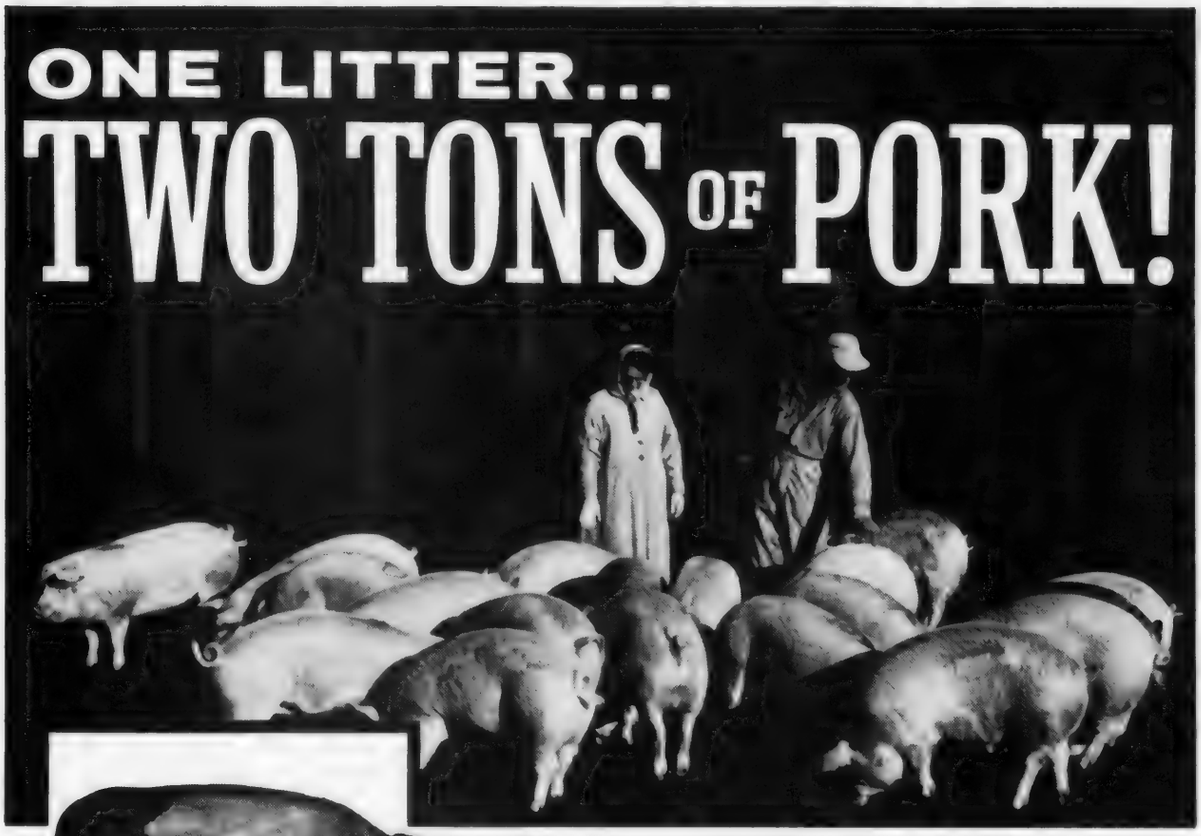
Firestone

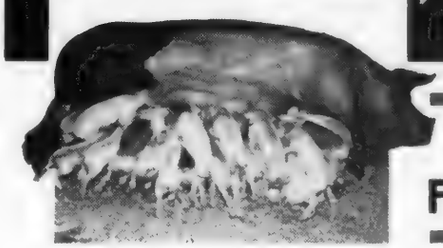
FIRST IN FARM TIRE NEEDS

Copyright 1961, The Firestone Tire & Rubber Company

Bob McCance, foreman, Richmond Chase Co., Elk Grove, Calif., says: "*In the vegetable growing business the crops won't wait for tire troubles. I can use Firestone Free Loaners if trouble ever pops up. Lester Foster & Sons will put them on when old tires are in for retreads, too!*"

ONE LITTER...
TWO TONS OF PORK!





IN 5 MONTHS 7 DAYS AT A FEED COST OF ONLY 8.38¢ LB.

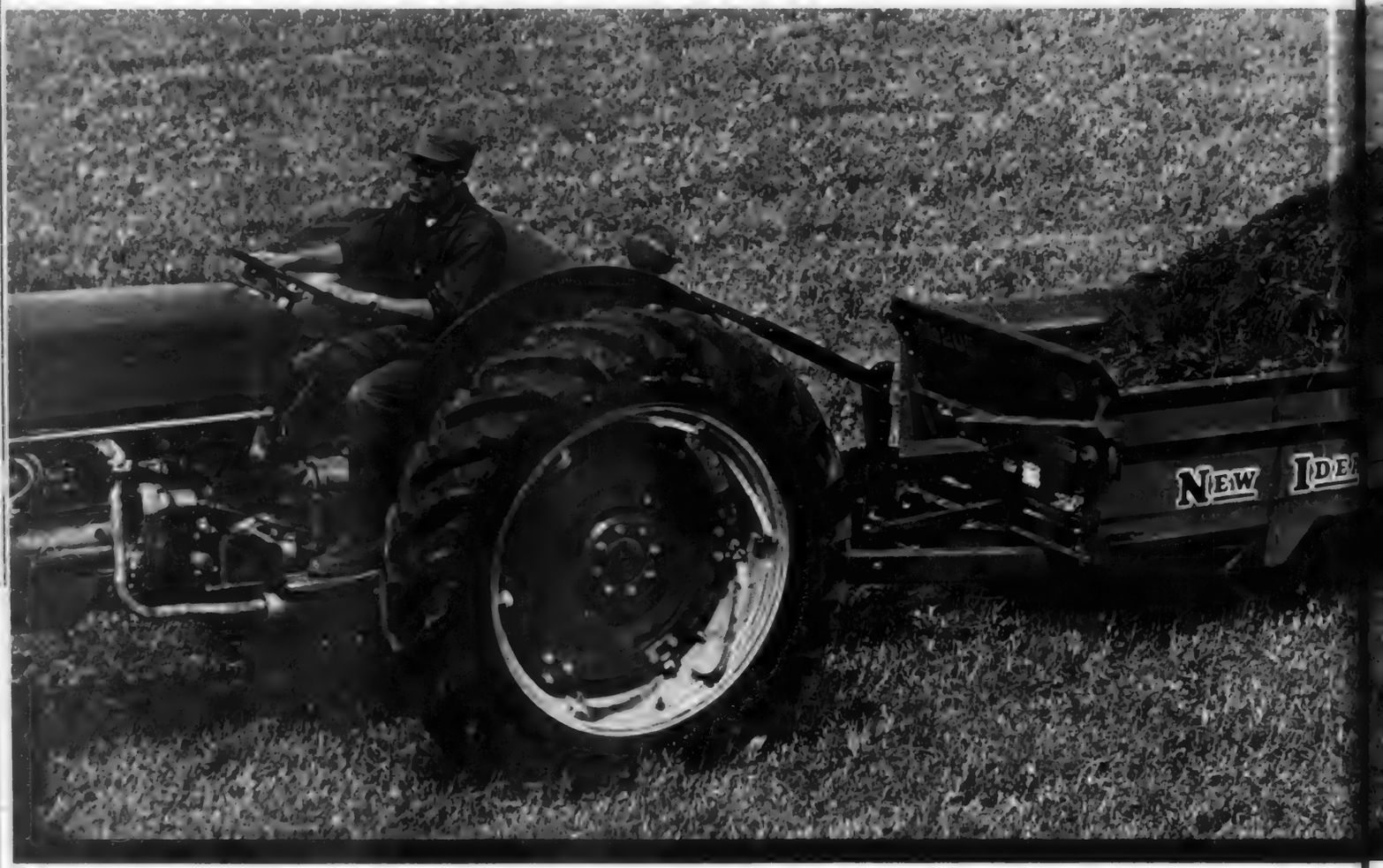
Wilson Cox, Fort Atkinson, Wisconsin, raised a fall litter of 19 pigs to a record-making 4,045 lbs., in just 5 months and 7 days. *And he did it under practical farm conditions, with feeds regularly stocked and recommended by his dealer as a part of every quality Wayne Tail Curler Program.* (This was the second Wayne-fed litter to top the two ton mark in recent years.) Feed conversion was 2.91 pounds of feed per pound of pork, with a feed cost of $8.38 per cwt., from farrowing to market. The pigs had an average daily gain of 1.33 lbs. ■ Here's what Mr. Cox says: "After farrowing, the pigs were alternated between the sow and Wayne Calfnip. We weaned them at 3 weeks, put them on Calfnip and Tail Curler Rockets—and they really *went to town.* ■ At 5 weeks they went on Tail Curler Jr., and then regular Tail Curler until 8 weeks. This was followed with concentrate and corn, using Pig Balancer and Hog Balancer, to market. ■ Every sow is fed Wayne Brood Sow Supplement and corn with Sweet Bulky added one week before and two weeks after farrowing. "We flush our sows with Brood Sow Supplement and corn mixed 4 to 1, and sincerely believe that this has a lot to do with making the large litters that we have been getting." ■ **Why not benefit from Mr. Cox's experience...let your Wayne Dealer show you how to "Bank on Wayne" with a proven Tail Curler hog feeding program.**

WAYNE FEEDS

ALLIED MILLS, INC.
Builders of Tomorrow's Feeds...Today!

Executive offices: Chicago, Ill. • Mills at: Guntersville, Ala. • Gainesville, Ga. • Peoria, Ill. • East St. Louis, Ill. • Fort Wayne, Ind. • Mason City, Ia. • Omaha, Neb. • Buffalo, N.Y. • Everson, Pa. • Memphis, Tenn. • Fort Worth, Texas • Portsmouth, Va.

America's most-talked-about spreader has a new BIG BROTHER!

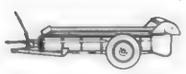


NEW IDEA now offers a

Only NEW IDEA offers a choice of flail or paddle spreader — so only NEW IDEA can give you the type you want in the size you need.

It didn't take farmers long to make up their minds about the flail spreader, even though it is a dramatic new concept in spreading. Now the new 160-bushel model offers the ideal spreader to owners of large livestock operations and big dairy herds. Both sizes let you spread in any weather.

Size is important, too. Picking the right spreader is as important as getting the right tractor. Buy a spreader that's too big, and you're over-invested. Too small, and you spend extra hours getting the job done. To help you make the right choice, NEW IDEA offers the world's most complete line of spreaders.


160 BU. FLAIL

130 BU. FLAIL

145 BU. P.T.O.

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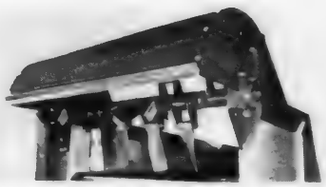
A year ago, NEW IDEA introduced the first flail spreader. Capacity: 130 bushels. Today, farmers everywhere are talking about this new kind of spreader.



flail spreader—160 BU big!

125 BU. P.T.O

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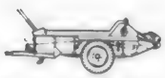
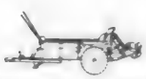


95 BU. GROUND DRIVE



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TGE

FQ REPORT

PROBLEM: Reducing loss from transmissible gastro-enteritis (TGE), a virus disease which wipes out complete litters of baby pigs.

BACKGROUND: The name transmissible gastro-enteritis has 4 parts. Taking them rear to front—"itis" means inflammatory disease and is derived from an old Greek adjective. "Enter" comes from the Greek *enteron* meaning intestines. "Gastro" is short for the Greek *gastros,* meaning stomach. "Transmissible" is used in its common sense: easily spread. Together, the parts of the name reveal an easily spread, inflammatory disease of the stomach and intestines. The naming and definite identification of TGE came in 1945; TGE caused heavy losses in Ohio in 1945, in Iowa in 1946, and is now a nationwide serious threat.

Symptoms. Identification of TGE is made difficult by diarrheal troubles closely resembling it. These may be due to overeating in the first 24 to 48 hours of life, nutritional deficiencies, or a variety of different, but usually less dangerous germs. Pigs of all ages are susceptible, but adults are not affected seriously. First symptoms are mild and TGE should be *suspected* whenever baby pigs scour, especially when neighbors have TGE on their place. Advanced symptoms in baby pigs, usually visible within 24 hours after infection, are vomiting; a greenish-yellow or lighter-colored diarrhea, and a rapid loss of weight; dehydration, and disinclination to suckle. Other common signs: a slight rise in temperature, depression, and trembling squeals of pain. Death takes 90 to 100% of infected pigs under 10 days old, beginning 24 hours after early symptoms. Dead animals have intestines swollen with gas and yellow liquid, and stomachs full of curdled milk. Food and water are poorly used by the animal. Death is hastened by dehydration, starvation, and the virus. In pigs 11 to 15 days old, deaths average 30%—40%; and pigs over 2 to 3 weeks old usually survive. Older pigs show diarrhea, depression, loss of appetite and vomiting. Sick sows give little milk, increasing the stress of their litters. Deaths are rare in adult animals and recovery occurs in a few days. Older animals may show symptoms first, in which case baby pigs may be saved by prompt, complete isolation.

Transmission. TGE is caused by a specific virus which affects only swine. It can be found in the kidneys, nose, lungs, liver, spleen and other organs, but the highest concentration is in the intestines. Food wastes passing through the intestines pick up crowds of viruses, so the spread of TGE from farm to farm is mainly in manure from infected swine. Within a herd, TGE viruses can be spread from pig to pig through the air. Virus-laden manure is often spread on farmers' boots. The best procedure when TGE is afoot in the area is to stay home and keep others away from the hoglot. A strict isolation policy, especially at farrowing time, is always good, as there are other suspected ways of introducing TGE, like infected feed and stock trucks. Dogs are possible spreaders, though they never get sick with TGE and don't seem to infect each other. The start of TGE in an area is usually due to an infected hog, often not obviously sick. Hogs can spread the virus 8 weeks after infection, or longer in rare cases. Therefore, quarantine of new stock brought to the farm helps prevent TGE infection.

Outbreaks. TGE occurs all over the U.S., but is uncommon in the South. Apparently viruses can't survive very long in hot climates, outside an animal's body. Peak infection is in spring. In a Purdue University study of about 150 Indiana herds, more than 90% of the outbreaks started between December and April. January, February and March were the most common months. March alone accounted for more new outbreaks than occurred from April to early December. The reasons for the peak are crowded pig-housing and ease of survival of the virus in cold weather. Outbreaks are spotty. Records show 50,000 pigs dying in one Indiana county alone. Nearby counties had much less trouble. Commonly outbreaks are less concentrated, and occur here and there all over the pig-raising areas. Two weeks to a month after TGE starts on a farm, it is usually all over. Chances are the farm infected with TGE one year, will be untouched the next year or two; but there is no guarantee.

STOPGAP MEASURES: If TGE strikes your farm, 1 of 4 measures may save litters that are yet to farrow. 1. Where the next farrowing is over 15 days away, deliberately infect the sows. 2. Disperse the herd and farrow in separate locations. 3. In central farrowing houses, farrow in groups and disinfect in between. 4. Sell enough sows to make a 90-day break in farrowing.

Deliberate infection. Never do this without consulting a veterinarian. It is easy to confuse less serious diseases with TGE, and deliberate infection after faulty diagnosis uselessly increases the disease problem. And there is danger of spreading the disease to other farms. Use deliberate infection *only* when part of the herd is already infected. It is seldom wise to bring TGE virus to an uninfected farm. Infecting sows is helpful when there is time for them to recover before farrowing. Antibodies to the disease, produced in their bodies, later pass into the milk and protect baby pigs. Time permitting, this is the most effective protection. In experiments, infection 13 to 15 days before farrowing resulted in baby pigs getting diarrhea, but most survived. At least a 15-day interval before farrowing is usually recommended. Method of infection is feeding chopped intestines of pigs sick with TGE. Sows usually must be starved for a day before they will eat the mixture. They suffer only mildly from TGE, and their unborn pigs are not affected. The material can be stored frozen, and fed as needed.

Isolated farrowing. Isolate infected sows. Spread the rest in small groups over separated areas on the farm. Each sow should farrow in an individual house. Different persons should care for the healthy and the infected animals. Maintain separated groups at least 3 weeks.

Batch farrowing. The herd should be split into diseased and uninfected groups, with separate persons caring for each. The difference is that the farm is set up for central farrowing only. Remove infected animals far from the farrowing area. Thoroughly scrub, disinfect and fumigate the farrowing house. Liquor cresolis has been used successfully as a disinfectant, and a combination of formalin and potassium permanganate as fumigant. Leave the facilities vacant as long as possible. Immediately move out any litter coming down with diarrhea. Keep healthy litters in the farrowing house until 2 to 3 weeks old.

Stop farrowing. Where a large number of sows are to farrow, a thorough cleanup, followed by a break of at least 1 month, preferably 2 or 3, stops the chain of the disease. Sell enough sows to avoid farrowing during the break.

It is essential to keep dead pigs from spreading the infection. Burning is best. Burial is OK, if the cover is 4 ft. deep to keep dogs away. If carcasses are to be shipped out, seal them in a garbage can until pickup. Droppings from infected pigs are prime sources of infection, so careful handling and complete removal of manure and bedding are a must to eliminate the disease.

TREATMENT: Little can be done for infected pigs. Keep them warm and comfortable, and provide fluids such as milk or water. Antibiotics may help save some pigs 5 to 10 days old—not by treating TGE, but to fight off other invaders complicating the infection. The disease puts pigs under the most severe stress and weakens their resistance to other diseases. As in most stress situations, antibiotics can be of great help. There is no effective medicine against the actual virus of TGE. Pigs that recover after medication against TGE most likely would have recovered without it. The future hope is for a vaccine. One obstacle is scientists are unable to grow the virus outside the pig. These difficulties complicate research. Pigs surviving TGE can be raised without any permanent stunting aftereffects. Sows that had the disease are preferred stock. Rebreed as soon as possible. This way the next litter will still get protection from antibodies in the milk. Present data at Purdue show this protection lasts 4 months.

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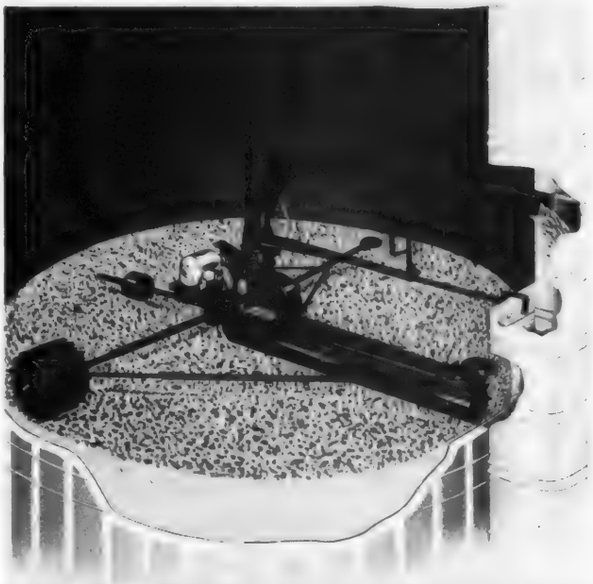

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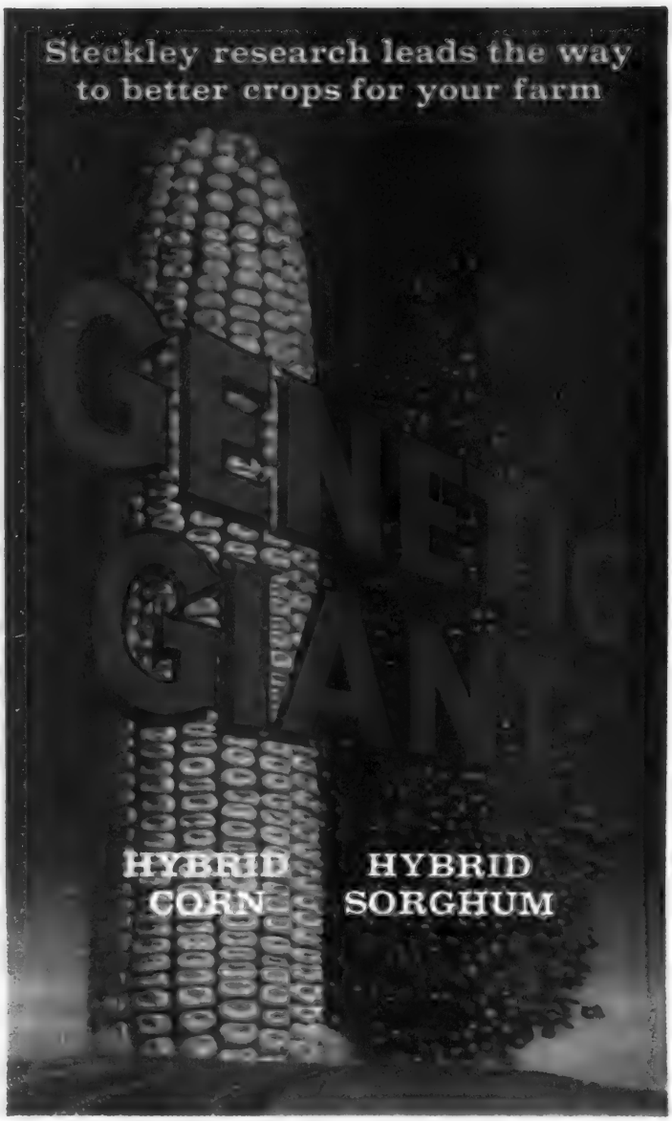

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LETTERS

From the White House

Sirs:

I was tremendously impressed with your excellent article on the Food For Peace Program. Everyone who has seen it has had an enthusiastic reaction.

George McGovern
Director, Food For Peace

The White House, Washington

. . . and from Austria

Sirs:

Greetings from Austria.

During this IFYE sojourn here in Austria I am meeting many people and hearing many tales.

A few days ago I met a woman who took great pain to express pride in her American-made woolen skirt. The story evolved that she had received the skirt in an American aid package given to her three years ago when the Salzach River rose, flooding her house in Oberndorf. She also told of American CARE packages which had come to Austria after the last World War. She described a "Zimmervoll Amerikanisch Mehl" (roomful of American flour) which had been given to Oberndorf after the war. She wanted me to know that the Austrian people were truly grateful for this and other assistance from our quarter.

In June I talked to a group of young students in the "Volkschule" (Folkschool—compares to American elementary) in Bramberg. When I had shown my slides, completed my talk, and was ready to take my leave they stood as if to attention and shouted "Grüess Gott" (God be with you).

Then, too, I remember a comfortable hour-and-a-half spent with five Catholic Sisters and nine of their select students in the "Privat Schule" (private school) in Bramberg. They asked many questions about the U.S. and were extremely interested in all the answers I had to give and all the pictures I could offer. Before I departed they sang a fellowship song and told me that the "Austrians send warmest greetings to America."

In short, everywhere I have gone in Austria there has been gratitude expressed to America, kindness shown to her people and warmest best wishes extended to the nation at large. These, Americans, are greetings I bring to you from Austria.

Chester Haas

Oberndal, Austria

Reviewing a Review

Sirs:

Thank you for . . . the favorable (and other) remarks concerning our book on "Farm Building Design" (page 8, Fall issue, THE FARM QUARTERLY).

No doubt both types of criticism are deserved. We know we have our weaknesses, but I feel that I must set the reviewer right by pointing out that the material on herringbone barns and tilt-up concrete can be found on pages V, VII, 60, 61, 200, 201, and 203. This is probably the only book in this field containing discussions and illustrations on these subjects.

Loren W. Neubauer

Department of Agricultural Engineering
University of California
Davis, California

Our sincerest apologies to Professor Neubauer. The book has several paragraphs on tilt-up concrete and the herringbone dairy. But this information is very general and neither subject is listed in the book's index.

Liked N.F.O. Article

Sirs:

We want to congratulate you on your article, "N.F.O. Demands Collective Bargaining." I do believe you have done the farmer a great service by the writing of this article. Keep up the good work.

Gerald Dusbahek

Faribault, Minnesota

Sirs:

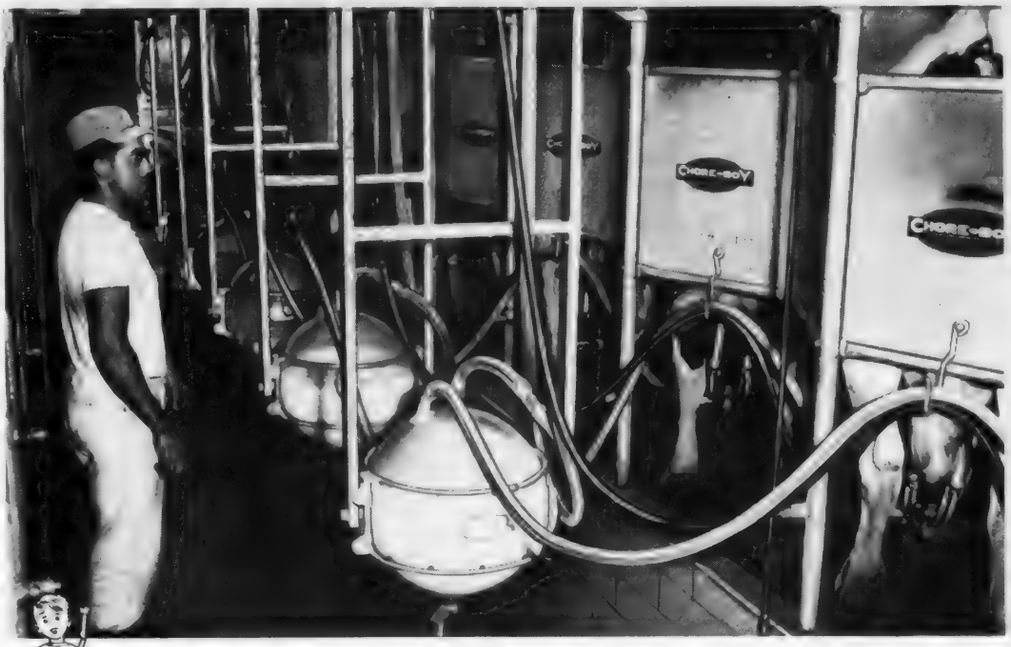
. . . I consider this one of the most fair and generally enlightening articles that I have seen in regard to the N.F.O., its aims, purposes and goals and how they hope to achieve them.

As active, interested members we are aware of the very potent force we have in the press. We are also aware that if every publication would give us the same pertinent, forthright treatment that you have that it could very well mean the achievement of our goal at a much earlier date.

(Mrs.) Elva Labertew

Udell, Iowa

For Highest Milk Production Per Cow– With Highest Milk Production Per Man– CHORE-BOY Can Help You Most!



AT THE CHORE-BOY DEMONSTRATION FARM one man using a Double-6 Herringbone Milking and Feeding System handles a 100 cow herd. The Farm is located 10 miles west of Richmond, Indiana, on Highway 40. Visitors are always welcome.

Show Up Your Lowest Producers—Milk Your Best Cows Better

A Chore-Boy Pipeline Milking System, equipped with Roll-O-Measures, enables you to see exactly how much milk each cow produces at every milking. Poor producers are easily spotted for elimination from the herd. The Roll-O-Measure shows bloody milk and milk from fresh cows which can be held from the line. You see when each cow has finished milking, for removal of teat cups.

The Roll-O-Measure separates the functions of milking and milk conveying. Each unit is close to the udder providing a nearby vacuum reserve, so necessary for fast, thorough milking. The milk flows only a few feet, at low level into the Roll-O-Measure, where it is held until the cow is milked. The unit is then tipped on its axis while the milk is automatically conveyed to the cooler. The Roll-O-Measure cleans-in-place along with the milking system.

Chore-Boy's gentle, low-vacuum milking helps remove a major cause of mastitis.

One Man Can Milk 50 To 60 Cows Per Hour With A New CHORE-BOY Herringbone Pipeline Milking System

Chore-Boy introduced the Herringbone System of milking and feeding cows in 1957. Now, with thousands in use throughout the U. S. A., Canada and other countries, the system is proving every day that it is the fastest, most efficient and economical method of milking and feeding cows. It is faster than any other type of stall and 2 to 3 times faster than pail milking. It is used with stanchion barns or loose housing. And may be used with small herds. Chore-Boy Systems are sold with a strong Guarantee and Service Policy. Let your system pay for itself as you use it. See your local Chore-Boy dealer.

Save Money By Buying Feed In Bulk

CHORE-BOY HAS THE ONLY NON-BRIDGING BULK FEED BIN

Dairymen find they save money by buying feed in bulk. Bulk feeding combined with automatic handling saves time. The Chore-Boy Feed Bin has a revolving steel link chain hopper. The feed moves steadily —no bridging or clogging. Sturdily built in 5 and 7 ton sizes. Extensions may be added. For the dairyman who prefers to build his own bin the hopper bottom will be sold separately.

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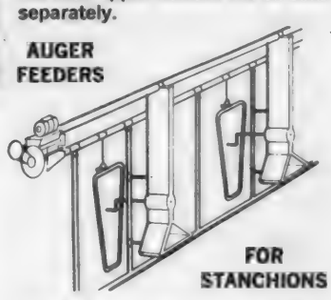

FOR STANCHIONS

Feed is automatically conveyed from either an inside or outside bin to the stanchion. Vertical feed chutes are automatically filled. A handle on the feeder releases exact amount of grain. Each feeder handles two cows.

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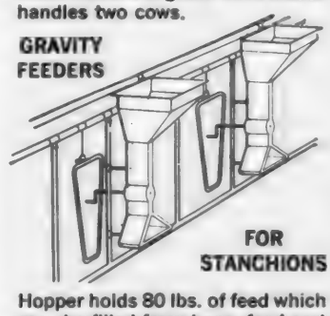

FOR STANCHIONS

Hopper holds 80 lbs. of feed which may be filled from bags, feed cart or an overhead gravity bin.

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No need to spend a king's ransom to drive royally. The '62 Chevrolet makes paying more seem pointless. Where else could you find a ride to match Chevrolet's Jet-smoothness (it's a road-softening blend of Full Coil suspension and over 700 chassis insulators)? And what could be more regal than the roominess and plush comfort and fine Body by Fisher craftsmanship you find in every '62 Chevrolet? If you like to command performance, you've a new choice of V8's all the way up to a new powerhouse* that turns out 409 hp. Match all the king's horses against *that!* Consider all Chevrolet's fine features, like air-vented brakes, longer lived mufflers, parallel sweeping windshield wipers, extra-large doors and the high-capacity heater and defroster that are standard equipment. This '62 Chevrolet fits just about anybody's notion of what a fine car should be. Fits moderate budgets, too, as your Chevrolet dealer will be glad to show you.

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Biscayne 2-Door Sedan—lowest priced Jet-smooth way to go

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Here's the new kind of car that a whole lot of people have been wishing would happen. A likeable tightwad that's easy on the eyes, easy on the road and ultra easy on gas. And what little service and maintenance this new Chevy II requires is simplicity itself. Repairs, too, are easier, less expensive. Fixing a damaged front fender, for example, doesn't put a big dent in your wallet because front fenders bolt on and off easily. Interiors are surprisingly roomy and comfortable. Mono-Plate rear springs (a new kind of flexible steel beam design) cushion you with delightful gentleness, eliminate the friction of multi-leaf springs. We could give you lots more to read about (like the Body by Fisher craftsmanship and the standard equipment heater and defroster), but why not go down to your Chevrolet dealer's and take a reading on the Chevy II yourself? . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

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Minnesotans Increase Yields 25%

They Cut Fertilizer Costs 50% Using Sudbury Soil Test Kit!

Corn, knee-high in June, flourishes on the soil-tested land farmed by 80-years-young H. R. Anderson and his five sons near Madelia, Minn.

EVEN in areas of top soil productivity any soil can be improved, H. R. Anderson of Madelia, Minnesota, has found. Mr. Anderson and his five sons farm a total of 2178 acres near this southwestern Minnesota community.

"Our Sudbury Soil Test Kit paid for itself with the first ton of fertilizer and has been saving us money ever since," Mr. Anderson reports. He has used the kit for five years.

While letting his sons take over operation of the large farm machinery, including 12 tractors, 2 self-propelled combines, 2 self-propelled corn pickers and 2 corn dryers, Mr. Anderson does all the soil testing. He has found most of the land the Andersons farm did not need potash and phosphate, but was lacking in nitrogen. Yearly check-ups, of course, keep track of any changes which may occur.

Contrary to advice he had received, he found a large area of drained lake-bed land had sufficient nitrogen and potash, but was lacking in phosphate. Last year, after getting a good balance in the soil, the lake-bed land produced the driest corn at picking time.

Use of the Sudbury Soil Test Kit is timely and handy, Mr. Anderson reports. He no longer needs to wait six months for reports and can carry his kit to any spot that needs testing.

Sudbury users all over the country report increases in yield and quality.

Soil testing is always done before the Andersons use commercial fertilizer. Mr. Anderson is shown making a soil test with his Sudbury Soil Test Kit.

Save Up to $15 an Acre on Fertilizer Costs

Guessing on fertilizer costs plenty. It wastes both time and money. One wrong guess could cost you more than a dozen soil test kits. You can't afford to buy fertilizer and not know it's what your soil needs. By Soil Testing, you'll get back $10 or more in extra yield for every dollar's worth of fertilizer you use. With the Sudbury Soil Test Kit you find out from the soil itself what fertilizers are needed for top yield.

MAIL COUPON for Bigger, Better Crops in '62

Farmers Lifetime SOIL TEST KIT

Takes only 10 minutes; costs less than 10c a test. Immediately tells lime (pH), nitrogen, phosphate, potash needs. You save fertilizer costs; increase productive capacity of your land. In no time you'll know more about your soil than you could otherwise learn in a lifetime of farming. Because it will make more money for you from everything you grow, you'll use it every season as long as you farm! Strong steel chest; instructions covering needs of 225 different crops. Lifetime Kit, like Mr. Anderson's, other successful farmers, **$29.95**

Make More Money

Fields full of fine crops are a satisfying sight to any farmer. Sign of a job well done, they're like seeing money growing and rippling in the breeze. And whether you farm 10 acres or 1000, Soil Testing is the first step in improving yields. Crop experts say average yields can be doubled. Higher yields are the way to lick the cost-price squeeze. In just two weeks your Sudbury Soil Test Kit will pay for itself many times over!

Better Crops Guarantee

You take no risk! If you don't get bigger, better crops with your Soil Test Kit by next Fall, return it. We'll return your money. *That's how much confidence we have in our Kit and You!*

FREE TRIAL

No Knowledge of Chemistry Needed

It's as easy to read as a thermometer. Your very first test will be accurate. Kit comes fully equipped for 300 tests. Well-illustrated instructions are easy to follow. It's so reliable county agents, vo-ag teachers, colleges, extension workers and successful farmers everywhere depend on it. You'll take it out into the field to make on-the-spot tests. *More than 500,000 kits are now in use!*

SEND NO MONEY

Order your Sudbury Soil Test Kit C.O.D. plus postage—or send check and we will prepay, saving you from $1.91 to $3.55 in postal charges.

Easy Payments if Desired

MONEY-BACK GUARANTEE

When you receive your Sudbury Soil Test Kit, use it for 10 days. If you're not delighted, send it back. We'll return your money and your tests are free.

FREE BOOK

"Our Land and Its Care." If you send check, we pay postage and include this valuable 64-page book on farm management **FREE**!

ORDER RIGHT AWAY!

SUDBURY LABORATORY, Box 1549, Sudbury, Mass.
Attention: H. J. Atkinson, Director

Send me the Farmers deLuxe Sudbury Soil Test Kit at the special low price marked below:

☐ Enclosed is $29.95; send postpaid; include free book, "Our Land and Its Care."

☐ Send C. O. D. only $29.95 plus postage.

Name .....

R.D. or St. .....

P.O. ..... State .....

☐ Send on Easy-Payment Plan—I'll pay mailman $7.95 plus postage, then 4 monthly payments of $6.00 each.

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SUDBURY LABORATORY Soil Test Kits

Box 1549, Sudbury, Mass.

The World's Largest Maker of Soil Test Kits

OVER HALF A MILLION NOW IN USE!

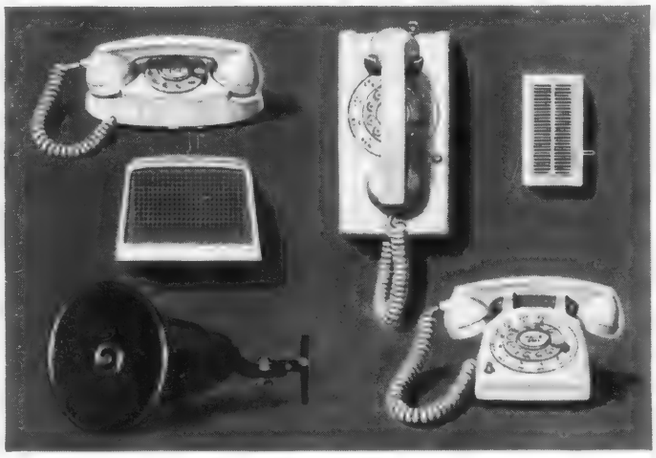
NEW FARM interphone

• Stretches your time • Gives you tighter control of your operation

Farm Interphone ties your whole farming operation together. It's a new system that gives you both regular telephone service and intercom from strategically located points around your farmstead.

With it you can talk and hear over a wide area without taking a step or interrupting your work. Your wife can handle calls and talk with you without constantly running to and from the buildings.

Interphone helps you run things more smoothly —accomplish more every day.



Basic equipment

The basic Farm Interphone system consists of one main telephone in the house, an extension phone in the barn or other buildings and a two-way loudspeaker located in the barnyard. Each telephone is equipped with a special loudspeaker-microphone. Extra phones or loudspeakers are optional.

Saves trips between house and farm buildings

Suppose your wife has an outside call and she needs to discuss it with you. She can "hold" the call, "broadcast" to you, get your reply, then complete the outside conversation. Or you can take over the call in the barn, if you wish. From the main station your wife can connect you with the outside caller.

Hear that ring?

When you prefer, your telephone ring is broadcast over the outside speaker and speakers at other Interphone stations. This means you don't miss important calls when you're away from the house or the farm buildings.

Talk "hands-free" right where you are

When your wife calls on the intercom you can answer without picking up the phone, without interrupting your work. A handy feature around the farm. Or, if you want privacy, pick up the phone and talk directly to her.

It makes farm living safer

In an emergency a person on an Interphone farm can make his voice heard all over the farmstead through one or more stations. You can't put a dollar value on this benefit.

It talks to you and you can talk to it

The loudspeaker broadcasts or picks up your natural speaking voice at considerable distance. The paths between the buildings get shorter with it on duty in the farmyard.

Fence is fixed, what's next?

Time and steps are saved by planning and outlining the next job over Interphone. Otherwise you'd have to spend time locating your helper or he'd have to find you.

An "ear" in the farm buildings

Each Interphone station is an alert "ear." All sounds are transmitted to the house. Your prompt attention may very well save animal life or property damage.

Need to locate a hired hand?

Pick up the receiver at any station and you can broadcast your voice to all the other stations, including the loudspeaker in the yard. A quick, effortless way to locate another person.

If you'd like to know more about Farm Interphone and what it can do for you, just call your local Bell Telephone Manager—or ask your telephone man when he is in the neighborhood—or mail the coupon below. There's no obligation on your part, of course.

Mail this coupon to:

American Telephone and Telegraph Company
Farm Interphone Division, Room 513A, Dept. 1
195 Broadway, New York 7, New York

I would like complete information on Farm Interphone.

Name_____

Home Address_____

City_____ Zone____ State_____

Telephone Number_____

BELL TELEPHONE SYSTEM

Slatted Floors

FQ REPORT

PROBLEM: The advantages and disadvantages of various slatted floors.

BACKGROUND: Slatted floors of wood, concrete or metal have gaps or holes so manure drops through to a subfloor below. Australian sheep-shearing sheds have had slatted floors for years. They are not uncommon in Europe today, having gained acceptance slowly during the last 10 years. A few American farmers and one or two universities have installed various types of these floors for different classes of livestock during the last two years. In general users like them, but there have been no large scale, well-controlled tests comparing slatted floors with conventional floors under U. S. farm conditions.

APPLICATION: Slatted floors can be used for poultry, hogs, sheep and cattle. They save bedding and labor. They can substantially increase stocking capacity of a building. They can be designed to save manure—or get rid of it. The sizes of the slats and of the spaces between slats vary for each type and age of livestock. Some believe all animals must have access to an area of conventional floor. Others contest this.

A major decision, not related to the slats, must be faced when installing a slatted floor. Are you going to use the manure? Or are you merely interested in a low cost way of disposing of it? This decision will determine what is placed beneath the slats.

POULTRY. More slatted floors have been used for chickens than for any other livestock in the United States.

Wooden slats are most common for poultry. Wire mesh and expanded metal are used, too, but they corrode. The wooden slats are usually ⅜″ wide and about 1″ deep, with straight sides. They are made up in 4-ft. x 4-ft. squares, supported at the edges. The supports may be 1″ x 8″ boards on edge, every 4 feet. These are light to move and will support a man. A high density of birds is essential in a slatted floor operation. The high density has several advantages: the birds can't chase one another far; they tend to tramp manure through the slats quickly; and there is no litter to accumulate moisture. Air gets under the birds to cool them in warm weather. The operator should not work in the building causing the birds to crowd out of his way.

Management must prevent the buildup of manure on, between, or under the narrow slats. Poor nutrition or poor ventilation may make the droppings sticky and encourage them to build up on the slats. Buildup of manure makes pointed tops to the slats, causing stress in the birds, which is reflected in egg production or growth rate. Some slatted floors have been neglected until the birds were almost walking on knives.

One design has the slats running across the building, sloping inward 1″ in 4 ft. towards the center aisle. This is designed to roll floor eggs to the center aisle for collection.

However, many engineers insist upon the slats being parallel to the feeders and waterers, which commonly run the length of the building. They claim as the birds face the troughs their toes are across the slats and thus more slats carry the weight of the bird. The 4′ x 4′ squares can be turned either way—and also reversed when wear is great on one side.

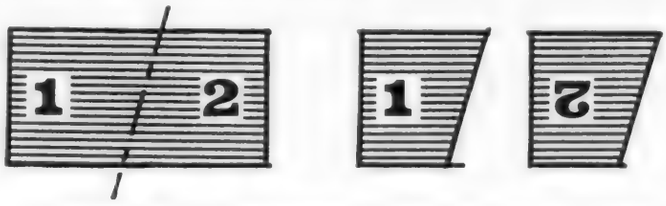
With an automatic cleaner the space beneath the slats should be around 14″. The cleaner is operated daily, or a minimum of twice a week. With tractor or hand cleanout there should be 36″ space beneath the slats, and the manure should never get closer than 6″ to 8″ from the slats.

Poultry manure under slatted floors without an automatic cleaner, may have to be removed every 6 months to 2 years. The University of Nebraska is experimenting with a manure lagoon, 3 ft. deep and the same size as the floor, immediately underneath a poultry house.

HOGS. Hogs have been housed on slats made of wood, concrete, and on expanded metal. For hogs and cattle, each slat must be able to carry the total weight that could be concentrated there.

The wood must be hardwood; either green white oak, or green elm are most commonly used. Softwoods wear out fast. Green hardwood is more easily nailed and sawed. However, it tends to warp and crimp more than the cured hardwood. Green white oak can be bought in the Midwest at $85 for 1,000 board feet.

Slats for hogs vary in width at the top from 1½″ to 5″. The spaces between the slats vary from ½″ with the narrow slats to 1″ with the wider slats. All hog, sheep and cattle slats should be narrower at the bottom than the top. (With slats less than 3″ deep this may not be necessary.) Ideally, both sides of the slats angle inward to form a wedge. However, acceptable slats have been made by cutting 8″ lumber in half on a 15° angle, making two slats—each with one straight edge and one chamfered edge.

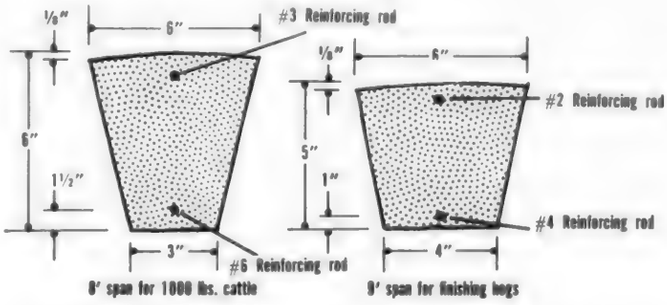


At present the only manufactured wooden slat for hogs is made by the Fairfield Engineering and Mfg. Co., of Fairfield, Iowa, and is being marketed by The Big Dutchman Hog Equipment Division. They make a platform of slats 2′ wide by 7′ long containing slats 1½″ wide with a ⅝″ space. The slat is chamfered on one side to 1″ wide at the bottom. It is 3″ deep.

One farmer's experience seems to indicate slats should not be used for farrowing crates or very young pigs. Young litters tend to get damaged forelegs from slats and, if the spaces are too wide, may get trapped and crushed by the sow. He feels that 3 days is the minimum age for turning pigs onto a slatted floor. But work is being done to perfect slats and expanded metal for farrowing.

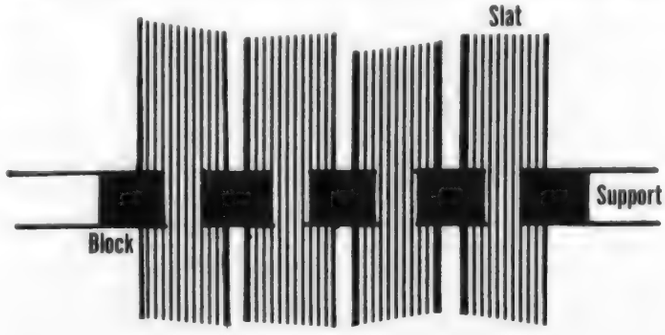
One design uses a slatted dunging alley. The bedding area is conventional, a slatted floor passage is used for manure. It may be mechanically cleaned, or may slope to a pit or lagoon.

Concrete slats are also used for hogs.



Manure tends to build up on the supports between the slats. A Norwegian solution has been to cut a slot in the slat above the support and place a block in this gap. One way is to oil the hole well, then pour concrete to form the block.

These blocks can be altered to change the gap for different animals. Without this block, manure tends to build up above the



YOU CAN HAVE A BETTER FARM...

(and it could be the one you're operating right now!)

Do you have these problems? Do you have brush, rough land, poor drainage, improper water distribution, gullies, inaccessible crop or range land, inadequate water supply? If you want to change these conditions a Cat Diesel Farm Tractor can help you! Here's how:

CLEAR THE LAND – with a Cat Diesel Tractor you can transform wasteland into more productive crop or pastureland! Remove trees and rocks to increase the carrying capacity of your pasture, develop new or better crop land, change fence rows for more efficient use of farm machines.

DEVELOP A WATER SUPPLY—if your farm is short of water, you may solve that problem by building a lake or pond to impound water. It might also help control soil erosion. Stock it with fish and use it for boating and swimming. A good water supply reduces farm fire hazards.

FORM YOUR LAND—fill in gullies so you can work across them, add new land to your farm. Form the fields for better irrigation and drainage. Build waterways and terraces for water control.

APPLY BETTER PRACTICES – with a Cat track-type Tractor you have power and traction to do many jobs that were "off limits" before; work the subsoil for greater water penetration and root development, work side hills or correct wet areas.

This is your "new" farm: a minimum of wasteland; properly formed for maximum land use; a more pleasant place to live and work.

A Caterpillar track-type Tractor for the heavy jobs, as illustrated by the above photos, in conjunction with wheel tractors for the light tillage work helps you have a better farm . . . helps you farm better.

Your Caterpillar Dealer can put you in touch with competent land improvement contractors who do quality work with Caterpillar quality machines. If the size of your operation is such that you can profitably do your own heavy work, ask your Dealer to demonstrate the capabilities of the right size machine to fit your needs.

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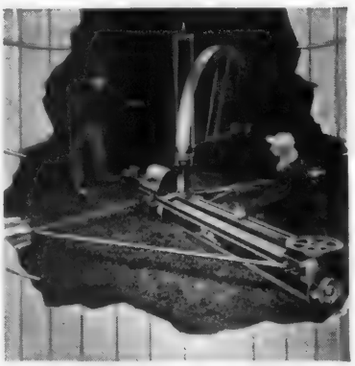
SILO UNLOADER—Only the Brillion has all ten of the most-wanted features asked for by silo unloader owners. Straight line feed augers silage straight into blower, results in high capacity and dependability even under hard-packed and frozen conditions. Circles silo in 1¼ minutes.



EACH LOADED WITH PERFORMANCE FEATURES

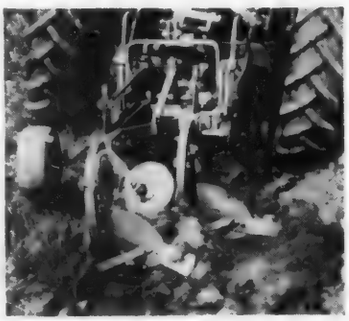
SHREDDER—(New Model RSS) Reasonably priced yet does most of the jobs of heaviest shredders. Takes a 60 inch cut. Features reversible wheels . . . turn the hubs out (shown) or turn them in and trail for close-up cutting. Two swinging blades. Other shredder models cut up to 144 inches.

YOU WON'T FIND ANYWHERE ELSE

PULVERIZER—(New PT-144) First major advance in pulverizers in a decade. Retractable transport wheels permit fast endwise towing from field to field. Triple sealed ball bearings never require greasing. New tubular frame design. Double bearing at center. Ten and 12 foot widths.

AND EVERY UNIT IS CAREFULLY CRAFTED

"JUMP PLOW"—(New Delfin Junior A) First fully automatic trip plow. Plow bottoms lift individually to pass over obstructions and then reset themselves immediately. No stopping—no backing up. Ruggedly built of high alloy steel. Adjusts from tractor seat. Great in stony and freshly cleared ground.



TO LAST AND LAST AND LAST

PLOW PACKER . . . widely used behind plow to minimize tillage. This simple tool levels and smooths furrows . . . does such a good job that many plant directly on a plow-packed seedbed. Think of the savings in gasoline! Sizes available to fit most pull and lift type plows.

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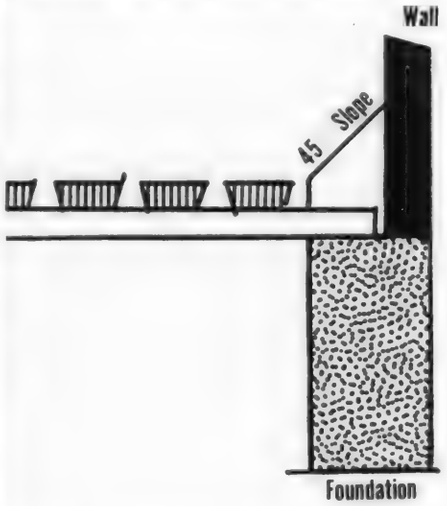
☐ PULVERIZER ☐ I am a student

Write name and address in margin

support and grow along the gap.

Some farmers found that hogs must be kept from the edge of the slatted floor either by a bar like a farrowing rail, or by beginning the floor with a gap. Otherwise, manure piles up in the corner against a solid wall. A Norwegian design is to build a sloping corner—but still begin with a space.



Hogs on expanded metal were tried in a University of Illinois test. The mesh must be *roll flattened* expanded metal. (Wire mesh didn't work well; hogs were reluctant to step on it.) It costs around 70¢ a square foot. Use heavy gauge—¾" 9-11 gauge. This means ¾" diamond, 11 ga. steel expanded and flattened to 9 ga.; 16 gauge is too thin—becomes sharp with wear.

Lastly, you need tight packing of the hogs. Six to 8 sq. ft. per pig is good. They won't tramp manure through the slats if they have too much space. Confine hogs in one part of a pen while they are small, or if there are too few to fill it.

CATTLE. Slats can be wider for cattle 3" to 6" and spaced 1" to 2" apart. Calves need the 1" gap. Wooden slats must be 4" deep for a 5' span between supports, 6" deep for an 8' span. This will cost around $1 a square foot, without supports. Concrete slats need to be about 4" deep for a 5' span, 6" deep for an 8' span—all are reinforced. Beef cattle and young stock are commoner on slats than dairy cattle. Many Europeans put slats under the feeding area —with all animals the buildup of manure is much more rapid around feeders, where more dunging occurs—and have a straw-covered regular floor for the cattle to lie on. Given this choice, they won't lie on the slats. If hay is fed to cattle on slats, the hay may be scattered on the floor and wasted. Bunk space must be adequate.

CONCRETE SLATS. Slats made from concrete cost 1½ times to twice as much as wood. But they are permanent. And they stay drier than wood. Softwood wears out in a matter of months. Hardwood should last around 8 years. You usually cannot move concrete slats to clean the subfloor. Concrete slats must be reinforced.

All concrete slats must have a slight

(*Continued on page* 167)

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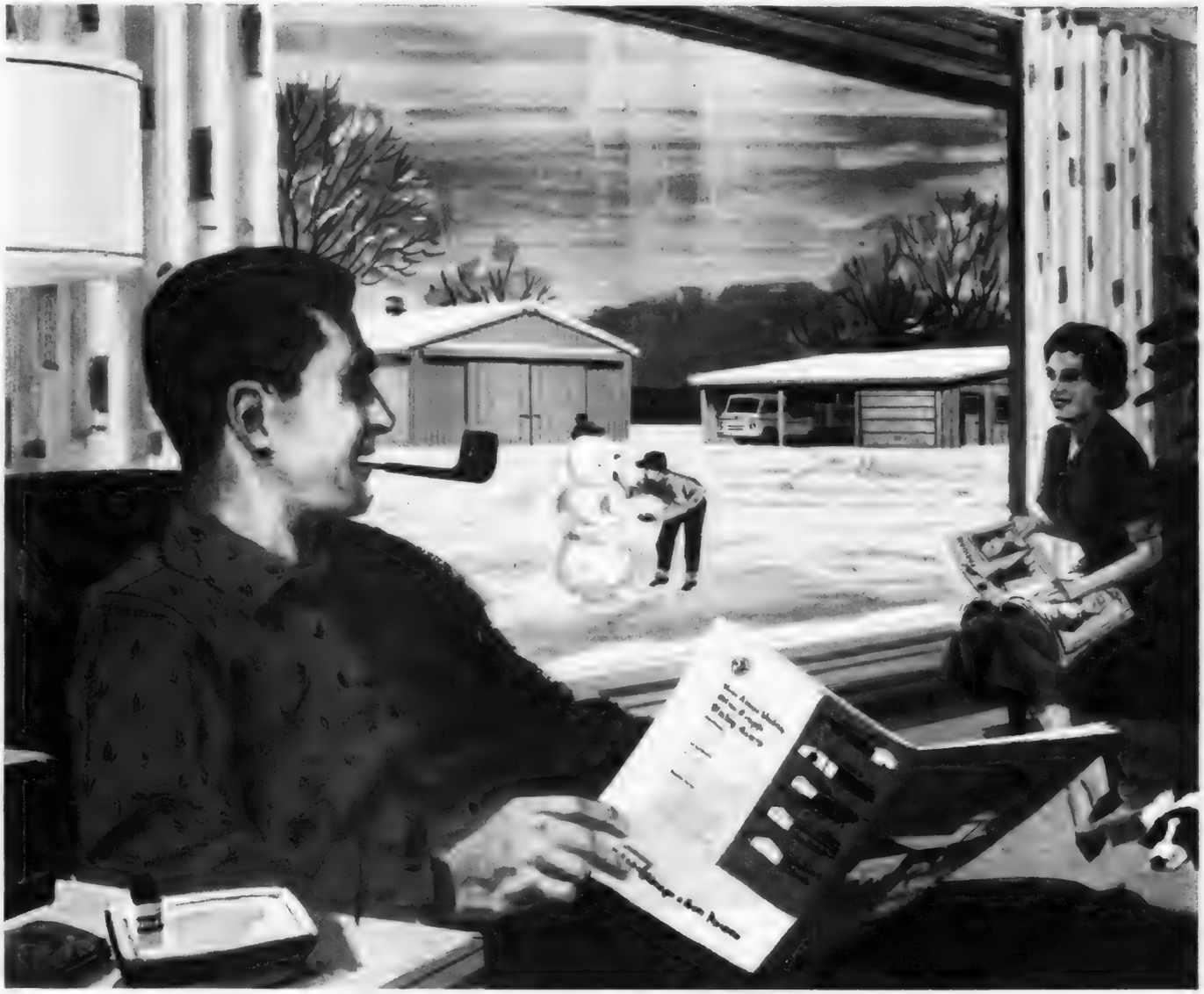
Strong
Durable
Economical



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Now, in the planning stage, is the time to see how Armco Steel Buildings can save you money and increase farm efficiency, with a modern building to fit *every* farm need. Low original cost, minimum maintenance and adaptability make Armco Buildings ideal for farm use through every season. Whatever your requirements – grain storage, livestock housing, machinery storage – you'll find what you need in Armco's complete line. Mail the coupon for more information.

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nf-180®
SUSPENSION
FOR THE TREATMENT OF WHITE SCOURS IN BABY PIGS
SHAKE WELL BEFORE USING
Each cc contains 100 mg. furaredi-done* with suspending and dis-persing agents and 0.15% parahydroxybenzoate esters as preservatives.
HERD SIZE WITH FURAMATIC DOSE DISPENSER
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HESS & CLARK, ASHLAND, OHIO
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All bottles come with special FURAMATIC DISPENSER—just depress plunger for 2 cc dosage. Available in Regular Size (100 cc bottle at 8¢ per dose) or Herd Size (450 cc bottle at 6¢ per dose). Write for free booklet, "Close the Resistance Gap."

See 24-hour results against baby pig scours

From the moment a baby pig comes into this world, until he builds up natural vigor to fight off bacteria, he is handicapped by a "resistance gap" which makes him a prime target for scours.

Be ready to help your pigs through this "resistance gap" with nf-180 Suspension. Here is a new oral treatment that shows results quickly, before scours have a chance to stunt and kill.

nf-180 Suspension works! From every swine-producing area come enthusiastic reports. University trials show a saving of up to 25% more baby pigs. nf-180 contains furazolidone which actually kills germs by starving them to death (unlike antibiotics and sulfas which merely slow down microorganism growth).

Treat the sow—to protect the pigs

Rather than wait for baby pig scours to strike, add nf-180 to the sow's ration one week before and two weeks after farrowing — for extra pigs saved and weaned . . . faster-growing pigs. And for further protection, add nf-180 to the pigs' pre-starter, starter and grower ration.

For immediate action, get nf-180 Suspension from your drug, feed or farm supply store — and ask your feed dealer about mixing nf-180 in the ration.

AH-25

PUT MORE HEALTH INTO LIFE
BY STARVING GERMS TO DEATH

nitrofurans

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Division of Richardson-Merrell Inc.

PURINA RESEARCH
makes Purina feeding cost you less

Cliff Perdew

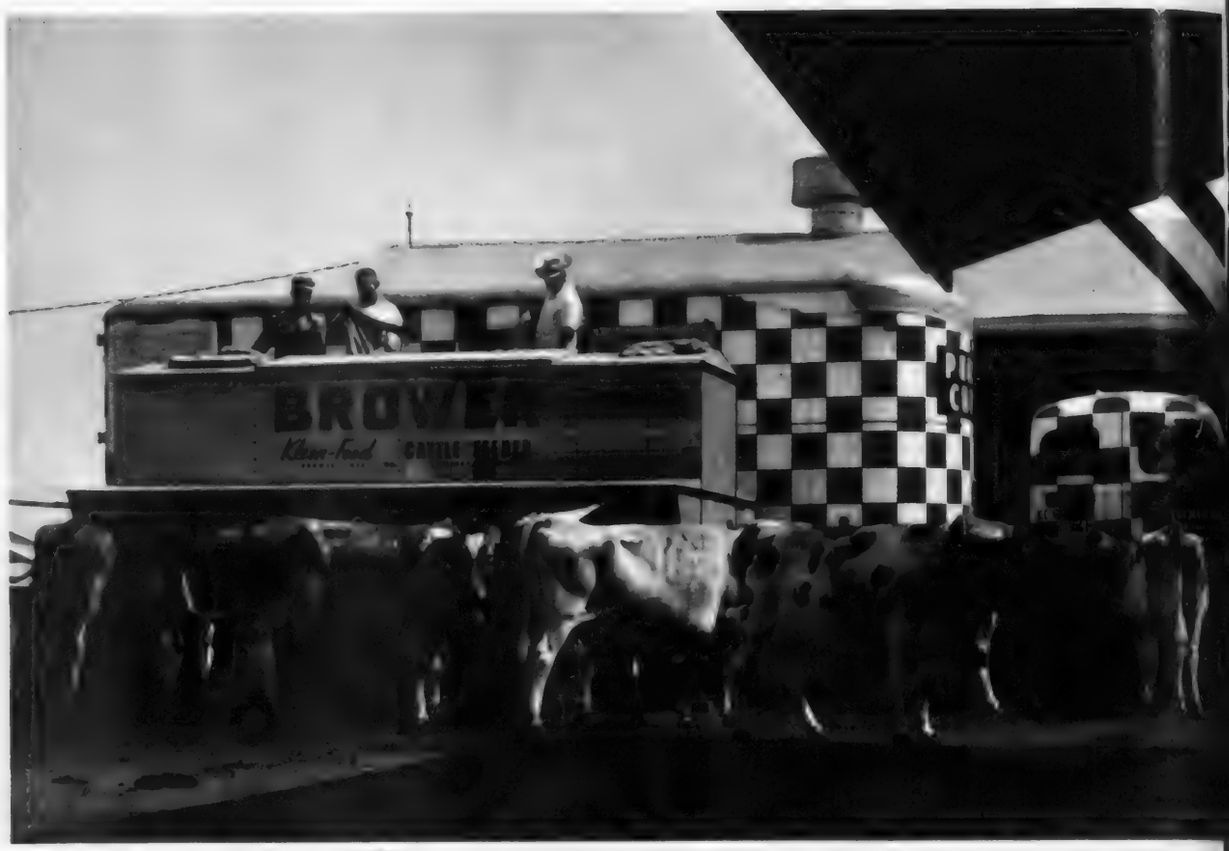
..top hand dairyman at Purina's Research Farm for 34 years

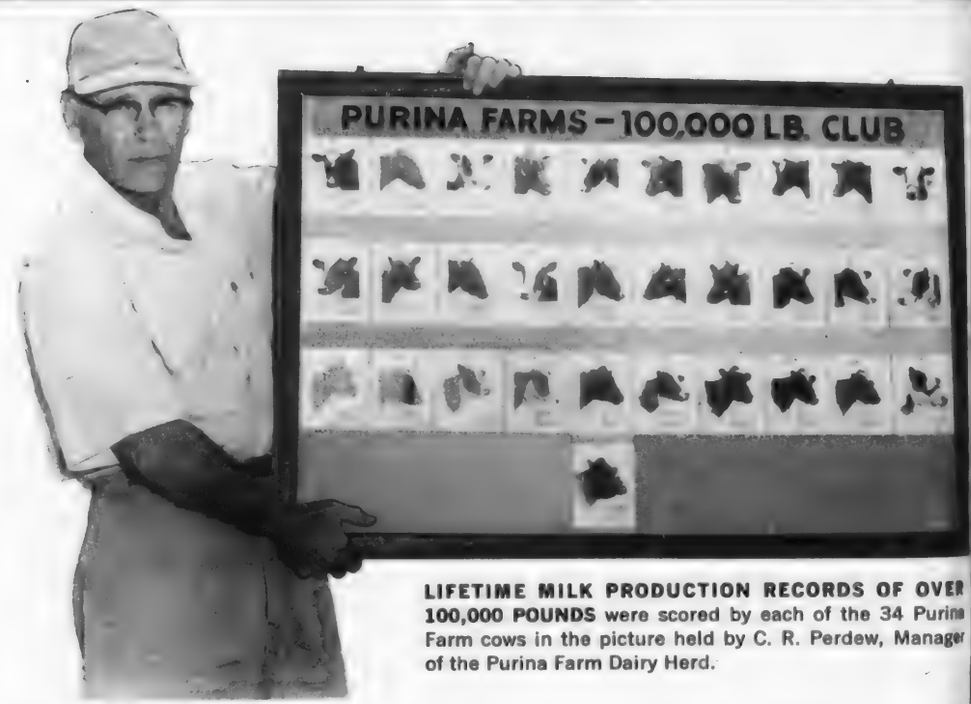
Clifford R. "Cliff" Perdew came to the Purina Research Farm, June 8, 1927 (when he was twenty-three years old), shortly after graduating from Missouri University College of Agriculture.

Cliff says, "At that time there were four dairy calves on test. We got busy fixing up the old Dairy Unit, which we used till a year ago, and bought eighteen or twenty head of local Holstein cows, none milking. Later, we went to Wisconsin and bought a carload of better quality grade Holsteins. That's the way we started, adding grade Guernseys in 1934.

How dry cow feeding program began

"Our dry cow feeding program sort of started by accident. We had a cull cow we were going to ship but decided to fatten her up first. Then we noticed she was springing and figured we would keep her until she





LIFETIME MILK PRODUCTION RECORDS OF OVER 100,000 POUNDS were scored by each of the 34 Purina Farm cows in the picture held by C. R. Perdew, Manager of the Purina Farm Dairy Herd.

freshened. That old cow did so well we immediately began experiments on dry cow feeding and heifer growing rations. Eventually our experiments led to the marketing of Purina D & F Chow and our entire Purina Heifer Growing and Dry Cow Feeding Program.

Purina heifers freshen early—give lots of milk

"At the Purina Farm we freshen heifers at 22–24 months against 28–30 months at the average dairy. The way we grow heifers, they come closer to produ ing at the top of their bred-in ability with their fi calf . . . reach their peak sooner and stay there long Where an average heifer might produce 70% of h top production during her first freshening, our hei would come closer to 80%. While our bigger, growth heifers often reach their peak in a couple of ye average heifers may take five or six years."

COWS ON **COMPLETE RATION** are fed from self-feeder. This feeding method, which is nearing practical use, will save labor, allow for handling many more cows in small space.

A PURINA FARM VISITOR makes friends with a youngster at Purina's Calf Unit. Here, calves are started on Purina Nursing Chow and Calf Startena on the fourth day. *No more milk is fed.*

HEIFER GROWING DEMONSTRATIONS like the one below are held across the country. They prove the benefits of Purina's Calf Growing Program. Ask your Purina Dealer for facts on raising calves Purina's Way.

Purina Calf Chows developed early

Since the early 1890's college research men were interested in developing feeds to raise calves cheaper—using less whole milk. Purina scientists, building on their work, developed Purina Calf Chow Meal in 1915. Twenty-one years later Purina Calf Startena—a dry complete feed—was developed. This product was a time-saver and milk-saver which more nearly met the calf's nutritional needs. It was followed in 1952 by Purina Nursing Chow, which is truly "milk plus." It replaces *all* milk after three days, and is extra fortified to protect calf health.

Low mortality—bigger calves at 4 months

The success of the Purina Calf Feeding Program is clearly written in the Purina Research Farm records. Of 2207 calves born—all raised on Purina calf starting programs—less than one per cent have failed to grow to maturity. At four months calves grown on Purina Nursing Chow and Calf Startena are far bigger and growthier than the average. Note these weight comparisons at four months:

	Average weight	Purina average weight
Jersey	176 lbs.	200 lbs.
Guernsey	177 lbs.	225 lbs.
Holstein	260 lbs.	320 lbs.

Artificial breeding used at Purina Research Farm

We've used artificial breeding since 1939 and now use frozen semen from registered, proved Silver and Gold Medal sires. *We didn't buy a single replacement heifer from 1927 until August, 1957,* when we began to add purebred heifers from high producing herds for the Danforth Farm Youth Center project.

"We now milk 115 cows. Although our research interferes with production . . . and emphasis is on research, not records . . . the herd produces better than twice the milk and butterfat record of the original herd," says Perdew.

34 Purina cows produced 100,000+ lbs. milk in lifetime

"The record of our 34 old cows, each of which produced over 100,000 pounds of milk, is a good recommendation for the way we grow and handle dairy cattle from the calf and heifer period, during lactation and as dry cows. Greatest single producer was cow number 907. She produced 180,377 pounds of milk in 11 lactations. Number 1116 actually produced 12 calves—the first ten of them heifers—and gave 146,576 pounds of milk in 11 lactations. But for a fall on the ice, she might still be with us! *These records look pretty good when you consider the average life of a cow is 5½ years!*"

High efficiency rations developed

"After years of formulating rations to please the eyes of dairymen—bulky, coarse rations of pleasing appearance—the cows convinced us this type of ration *did not* make the most milk.

"Our present high-efficiency rations include ingredients with highest milk-making energy; more corn or milo, less beet pulp, bran and oats.

"*Complete feeding is just around the corner.* Our original work on complete feeding of cows began in the '30's. It's now being adjusted, is near the point of practical use. This 'Built-in-Roughage'™ feeding method saves labor through self-feeding . . . allows for handling of more cows on less ground."

Cliff said, "We're pioneering today, just as we were in 1927. We will keep on testing new ideas, new methods and new rations in the interest of making dairying more profitable."

You can help prevent and control mastitis by using Purina Disinfectant solution as a flank and udder wash before milking cows.

Purina iO-Dairy is especially made for hand-washing and sanitizing milking machines, utensils, bulk milk tanks and other equipment.

Purina Dairy Health Aids tested at the Purina Research Farm

Working with the Farm herd, Purina Research has developed a complete line of dairy disinfectants, cleaners, and insecticides to fight profit-robbing diseases and parasites. Purina Health Aids, used as suggested on this page, help protect you from disease losses.

Disinfect stalls, equipment—use Purina Disinfectant Spray walls, gates, and equipment with Purina Disinfectant solution after washing with C & S Powder. It's harmless to skin when used properly . . . won't corrode equipment. Purina Disinfectant is widely used as a flank and udder wash and as a teat cup rinse to help prevent the spread of mastitis.

Purina iO-Dairy sanitizes utensils, milking machines You can wash and sanitize your milking machines, utensils, and bulk tank with Purina iO-Dairy—a iodine-type detergent, sanitizer, and milkstone r mover. It's also an effective flank and udder wa before milking, and a good teat cup rinse.

TRY PURINA'S DAIRY FEEDING PROGRAM

—developed at our own Dairy Unit in 34 years of testi Feed right—just as Purina recommends. Keep recor to prove to yourself that feeding Purina returns mu more than the little extra it may cost.

Your Purina Dealer . . . at the Store with the Checke board Sign . . . is the man to see for details of feedi programs and forms to keep your feeding records. P him a visit . . . and make it soon!

PROVE TO YOURSELF . . .
Purina feeding costs you less

"AFTER 7 YEARS OUR TRUCK IS STILL GOING STRONG...DOING MORE JOBS THAN EVER"

Donald Croft, Wooster, Ohio, knows what farmers across the country know – the versatile Eaton 2-Speed Axle can save time and money on every farm hauling job. "Truck breakdowns," says Mr. Croft, "can delay cattle feeding, harvesting, market deliveries and dozens of other important jobs. We've got to keep our truck rolling to keep the money coming in. So, back in 1954, we decided to switch to an Eaton Axle-equipped truck.

"Our dealer told us the Eaton 2-Speed Axle would help cut down on repairs. I'll tell you, he wasn't kidding. We haven't had a single breakdown in 7 years – and we've given our truck plenty of punishment.

"What's more, we've never seen a truck do so many jobs—and get them done faster and easier. Take wheat harvesting time. Eaton's low-gear range gives us the steady crawl speed we need to move smoothly with our combine. Once the truck is loaded, Eaton gives us the pulling power to churn right through soft, mucky fields. We get just the right speed to use our truck as a lime spreader, too.

"On level stretches of road, we shift into Eaton's high-gear range—and really travel at full legal speeds. The Eaton helps us get to market faster . . . lets us haul full-capacity loads – smoothly, with much less strain on the driver."

Why not ask your truck dealer for a demonstration right away?

"Getting the feed through every day is a must. After one of our heavy rains, the fields get so muddy, a conventional axle truck doesn't have a chance. With the Eaton's extra pulling power, we move right through . . . never have to worry about bogging down."

"We save on gas, too. I'd say the fuel savings come to about 15% per year with the Eaton 2-Speed. Because the Eaton Axle keeps engine RPM down, we find there's less strain on all power transmitting parts . . . less gas needed."

Dodge dealer, Walter Bates, Walter Bates, Inc., Wooster, Ohio, reports, "We've never had a complaint in all the time we've been selling Eaton-equipped trucks. Farmers not only get dual use with the Eaton, they get a higher trade-in, too!"

EATON 2-SPEED AXLES

EATON MANUFACTURING COMPANY, CLEVELAND 10, OHIO

More than 2 million Eaton Axles in trucks today.

"X" MARKS YOUR DAY OF OPPORTUNITY!

ATTEND ANOTHER ANNUAL

TEXAS CHAROLAIS & CHAROLAIS-CROSS SALE!

OFFERING

120 Charolais, Charbray and Charolais cross animals. This group is made up of registered purebred and recorded crossbred Charolais and includes open and bred heifers and cows.

DATE: Wednesday, February 14, 1962

TIME: 9:00 A.M.

PLACE: San Antonio Livestock Exposition, Auction Barn, San Antonio, Texas

OPPORTUNITY: See Charolais Shown And Judged The Day Before The Sale

All entries consigned to the sale will be screened prior to entry in the catalog.

AT BUYER'S OPTION ASSOCIATION WILL PROVIDE TRUCKING AT ITS EXPENSE TO GREEN VALLEY STOCKYARDS IN SAN MARCOS, TEXAS FOR BUYER'S ACCOUNT.

The Texas Charolais & Charolais-Cross Sales Corp. is affiliated with the American-International Charolais Association and the American Charbray Breeders Association.

Don't Forget Our Sale At The Capitol Livestock Auction Co., Austin, Texas, June 30, 1962. This Annual Event Is Held Each Year On The Last Saturday In June.

TEXAS CHAROLAIS & CHAROLAIS-CROSS SALES CORP.
P. O. Box 1201
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SALES CORPORATION

I'LL eat my stetson...

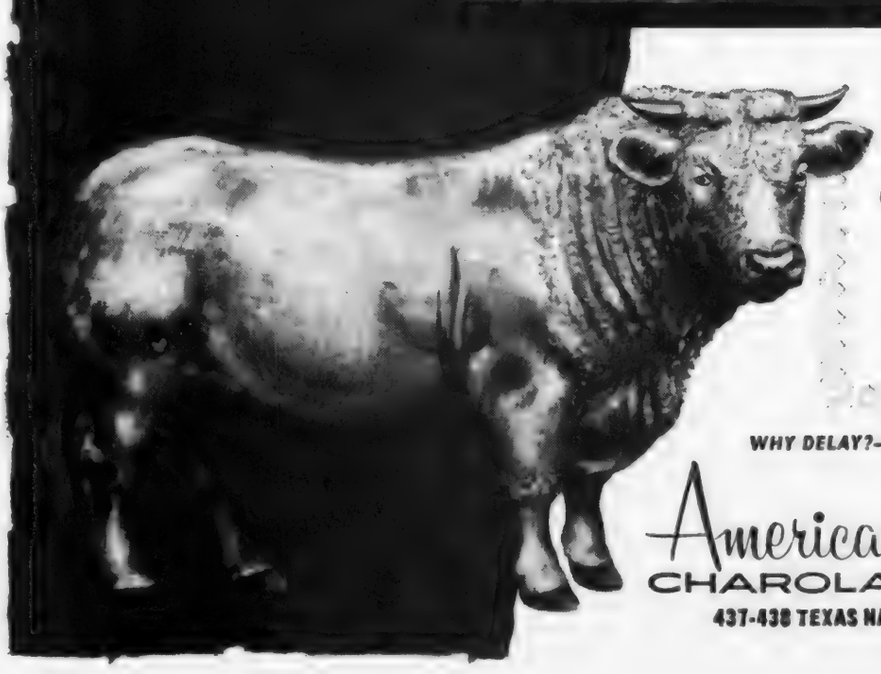
IF CHAROLAIS BLOOD ADDED TO YOUR HERD DOESN'T GIVE YOU THESE IMPROVEMENTS AND MORE..

- √ 10% bigger calves at birth with hybrid vigor built-in.
- √ Weigh up to 30% more at weaning
- √ Gain 8% to 20% faster in feed lots
- √ Grade choice dress above 60%
- √ Yield from 2% to 6% more lean meat in primal cuts

YOU CAN SEE CHAROLAIS CATTLE AT THESE GREAT LIVESTOCK SHOWS

Pan American Livestock Exposition
Dallas, Texas — Oct. 2-22
American Royal Livestock Exposition
Kansas City, Missouri — Oct. 13-21
Greater Jacksonville Fair
Jacksonville, Florida — Oct. 25-Nov. 4
International Livestock Exposition
Chicago, Illinois — Nov. 24-Dec. 2
Arizona National Livestock Show
Phoenix, Arizona — Jan. 2-6
National Western Livestock Show
Denver, Colorado — Jan. 12-20
Southeastern Fat Stock Show
Ocala, Florida — Feb. 2-10
Florida State Fair
Tampa, Florida — Feb. 6-17
San Antonio Livestock Exposition
San Antonio, Texas — Feb. 9-18
Houston Livestock Show
Houston, Texas — Feb. 21-Mar. 4
Southern Livestock Exposition
Tucson, Arizona — Mar. 7-11

These Charolais calves will be future producers of lean, tender muscle for more tender beef.



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HOUSTON, TEXAS

FEBRUARY 21, 1962

3:00 P. M.

See For Yourself Why The Trend Is Toward Charolais Today!

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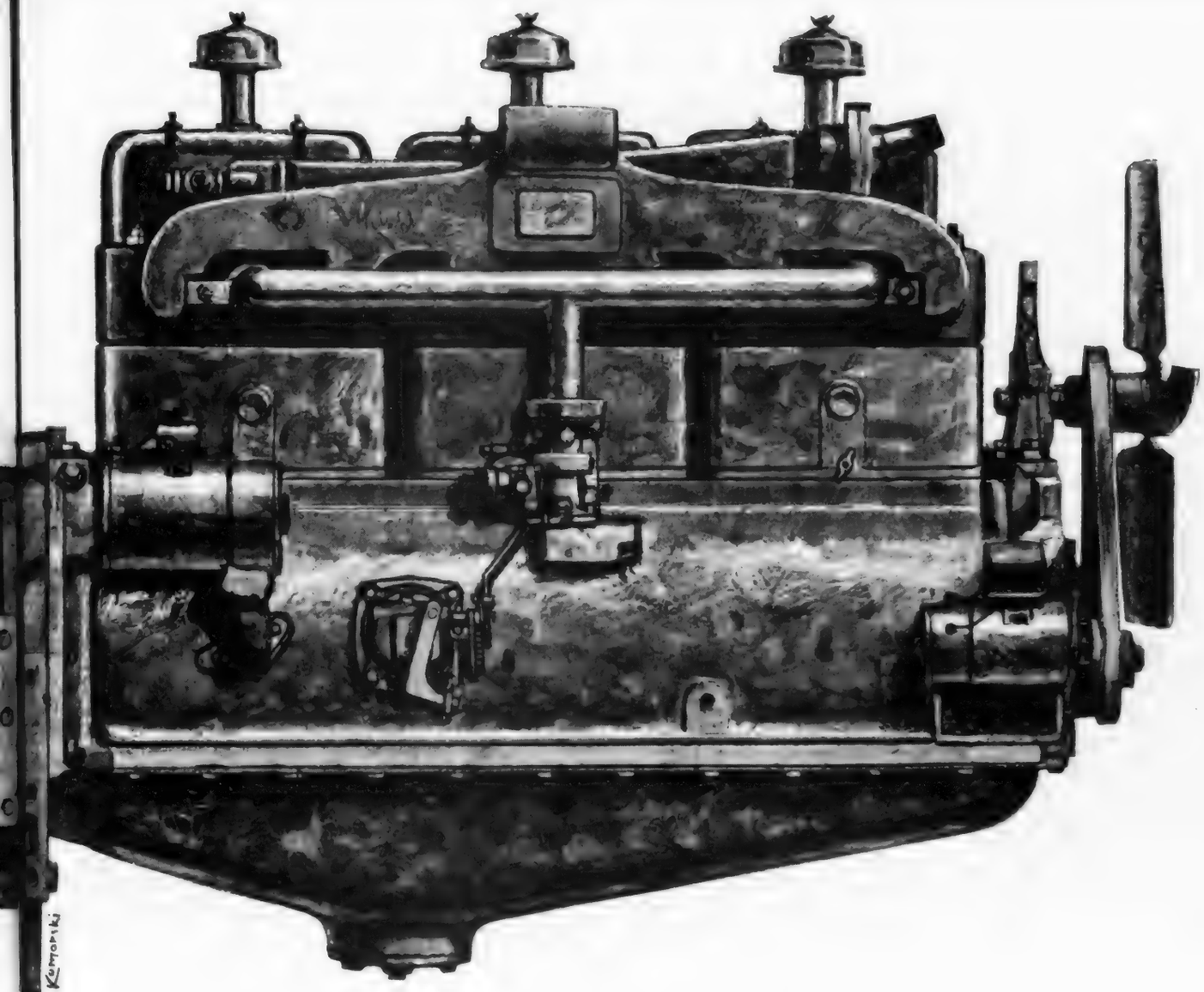
Moline's new GVI packs two tons of solid muscle!

Here's a 94 horse Moline-built power plant that'll pull 'most anything you can pin to the hitch.

FARM • MATERIALS HANDLING • CONSTRUCTION AND POWER EQUIPMENT • ENGINES • TRANSMISSIONS • CHAIN SAWS • ELECTRONICS



This is a brute of a tractor—designed to pull the biggest plows and tillers. It's solid muscle all the way through.

Start at the front. The blocks are cast in pairs, separate from the crankcase. This more costly, more painstaking manufacturing process is a Moline difference. The piston displacement is 425 cu. in—that's real power.

The extra large crankshaft is drop-forged and heat treated. Connecting rods are two to three times the size of those in high speed engines. The bearings are immense . . . yet more precise than the bearings of a fine watch.

It's this extra heft that enables Moline-built engines to develop high torque at less than 1,000 rpm. This power pulls you through the roughest ground.

The GVI is tough, too. The ¼" thick base pan is cast out of iron. The cast crankcase, the heavy transmission and the differential are all bolted together to form an unshakable solid column . . . with proper weight in front and in back for solid traction. This power train won't twist or rack, even under the heaviest strains.

The GVI gives you unmatched lugging power; yet this tractor is as easy to handle and as comfortable as your car. It's typical of the superior weight, power and engineering skill you'll find in every Moline tractor, regardless of size. See your dealer today and find out how Moline engineering and construction pays off for you . . . in the field.

MINNEAPOLIS MOLINE®

Farm Equipment Division of MOTEC INDUSTRIES, INC. MOTEC

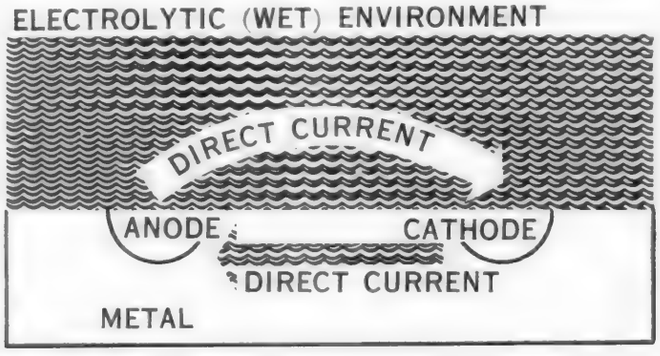
Corrosion And Rust

FQ REPORT

PROBLEM: To reduce corrosion on the farm.

BACKGROUND: Corrosion is the tendency of all metals to return to their unrefined state. It has been called a major industry in reverse. Iron rust, for example, is almost exactly like the unrefined, red iron ore as it comes from the earth. Every year in the United States the processes of corrosion destroy metal worth 7 billion dollars. On the farm corrosion can ruin equipment and buildings and greatly increase down time.

Causes. Although there are many kinds of corrosion, only wet (electrolytic) corrosion causes extensive damage on the farm. This corrosion is caused by tiny galvanic cells which form on the surface of the corroding metal. These cells are like minute storage batteries with a positive pole (anode) and a negative pole (cathode). In order for corrosion to occur, direct current must flow between these poles. These basic requirements of the corrosion system are illustrated below.



The metal of the anode and cathode areas exposed to the electrolyte must be dissimilar before the galvanic cell will form. They may be completely different kinds of metal touching each other or connected with a conductor, or they may be small surface differences in the same piece of metal. Corrosion occurs only at the anode where the current leaves the metal. Here the toughness of the metal is destroyed by oxidation, a process similar to the burning of a fire, but much slower. These anodes where the metal is corroded often show up as surface pits. Two ingredients which together form a very corrosive environment are almost everywhere —air and water. While it is almost impossible for the farmer to prevent air from reaching corroding materials, he often can very effectively reduce the amount of moisture present. Many farm chemicals, such as fertilizer, will increase the corrosiveness of the environment. Other chemicals, called inhibitors, slow corrosion by exerting an electrical influence in the environment which works in opposition to the galvanic cell.

Controls. The requirements of the corrosion system, as illustrated, are the keys to effective corrosion control. Anything which can upset this system may be used to slow or even stop the corrosion process. A coat of paint over the surface of the metal would upset the system by separating the metal from the corrosive environment. Corrosion products tend to inhibit other corrosion. Aluminum will corrode, but its impervious corrosion product, aluminum oxide, does not flake off the metal and itself becomes a barrier to the environment, preventing further corrosion. A metal may also be protected from corrosion by placing a more corrosive metal in contact with it. The more reactive metal becomes the anode where all corrosion occurs and thus prevents corrosion of the less reactive metal, which remains the cathode. This is one way corrosion is prevented on galvanized steel. The zinc coating on the steel serves as a sacrificial anode and prevents corrosion of the steel as long as there is enough zinc remaining. Bars of zinc attached to the bottom of ships often protect the entire hull this way. On galvanized metals, the zinc coating also acts as a barrier to seal out corrosive moisture. Altering the corrosive environment is a third widely applied method of upsetting the corrosion system. Ventilating a metal building to cut down corrosive moisture inside is an example of this method. Or an inhibitor may be added to the environment, such as the rust preventive additives prepared for use in automobile and tractor radiators.

TECHNIQUES: *Machinery.* These corrosion control techniques which can be used in this area fall into 4 main categories: rust preventives, paint, storage buildings and covers.

Rust Preventive Compounds—These usually consist of a petroleum base containing rust inhibitors, such as refined wool grease or petroleum sulphonates. Two types of rust preventives are best suited for general farm use. One is a soft grease-like type which is brushed or swabbed on machinery. This preventive will provide protection from corrosion for 10 to 12 months of continuous exposure to weather, and indefinitely for equipment stored indoors. The preventive can be removed with a solvent such as kerosene or diesel fuel. It should be cleaned from baler ties and seed and fertilizer hoppers before operation. The other type of preventive is a liquid, solvent type applied by brushing, spraying or dipping. It is best suited for equipment stored indoors. The solvent dries and leaves a film, effective for a year or more on equipment protected from the weather. Outdoors it is effective 3 to 6 months. Most large oil companies make rust preventives. Some of these are: Gulf No-Rust, Sohikote, Texaco Rust Proof Compound, and Valvoline Tectyl. They cost a little more than regular lubricating grease. Sprayers and fertilizer-handling equipment should be thoroughly cleaned of chemical residues before applying corrosion preventives. Neither should manure be left on stored equipment. Fertilizer should be brushed or scraped off metal equipment then *thoroughly* washed off and dried—*thoroughly* because fertilizer and water may form a powerful corrosive agent. Sprayers should be flushed with water after each use. Present crankcase oils—except those of the very lowest quality, contain enough rust inhibitors to protect an engine for about 3 months. A special rust preventive oil is available for protecting the inside surfaces of engines which are to be stored for 3 months or longer. The water-cooling systems of engines may be protected during use and storage by special corrosion inhibitors which can be added to water—they are already included in permanent antifreeze.

Painting—A good coat of implement paint on machinery, when properly applied, will help prevent corrosion for several years, but is more difficult to apply and in some cases not as effective as rust preventives. It should not be applied to surfaces that must be bright to work properly, such as plow moldboards and the tie mechanisms on hay balers. All rust, dirt, oil and grease must be removed prior to painting. Steam-spraying units using cleaning solutions, frequently used by equipment dealers, will save a lot of preparation time. Painting with a spray gun is about 4 times faster than brushing. Sheet metal parts, such as combine covers and tractor hoods, are greatly benefited by paint protection. The useful life of galvanized metals is extended almost indefinitely by the application of zinc dust-zinc oxide paint. For best service remove rust and scale.

Machinery, Storage Buildings—Corrosion can be greatly reduced in buildings, particularly when rust preventives are used to protect bright surfaces. Adequate ventilation is important to prevent the accumulation of moisture. Buildings should be on well-drained ground and concrete floors should contain a vapor barrier. Openings are best on the side away from prevailing winds. Neither animals nor stored material other than machinery should be housed in a totally enclosed building unless separated from the machinery by tight, moisture-proof partitions.

Covers—Usually made of treated cotton duck (tarpaulins) and reinforced or plain plastic. They are a good temporary corrosion control measure for machines which must be left in the field for a few days, and are especially useful in protecting exposed mechanisms which corrode easily, such as the automatic tie mechanisms

(*Continued on page* 42)

No other portable grinder-mixer offers so many advantages

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GREEN ISLE
FEEDMASTER

NO OTHER UNIT offers as much as the Farmhand-Green Isle Feedmaster. It's fast, thorough, rugged. It grinds and mixes all kinds of feed in any proportion . . . perfectly blends additives and antibiotics. With a Feedmaster you can grind and blend feed at your *convenience*, in *any quantity*, *any formula*, for *all types of livestock*, and deliver it *where you want it.* Use your own hay and grain, add supplements and antibiotics as you desire, to give you complete control of feed quality for all your animals. Check this partial list of Feedmaster features against the competition. Then call your Farmhand dealer for a demonstration on your farm—you'll see what we mean.

HERE'S WHY!

1. **GRINDS AND THOROUGHLY MIXES** any grain and roughage.
2. **FULL 16" HAMMERMILL** . . . fast, smooth, less dust.
3. **CAPACITY**—Up to 2 tons in minutes, 95 bu. tank.
4. **FAST, SIMPLE SCREEN CHANGE.**
5. **FEED IS AUGERED,** not blown, directly from mill into mixer . . . less dust, constant no-clog operation.
6. **12" MIXING AUGER** with thrower paddles, mixes while standing or moving.
7. **MIXING AND UNLOADING AUGERS** can be operated independently of the mill.
8. **LARGE, LOW CONCENTRATE HOPPER** only 29" from ground for easy loading. Rain cover.
9. **HIGH-LOW WINDOWS** for sight-checking.
10. **LARGE MANHOLE** on top.
11. **LADDER** is standard equipment.
12. **SWINGING DROP FEEDER** (optional) feeds from any position.
13. **10' UNLOADING AUGER** swings in arc alongside, can be raised or lowered in motion, locks in any position, folds alongside for safe transport.
14. **JACK** is standard equipment.
15. **SAFETY SHEAR PIN** on drive shaft and in both discharge augers.
16. **MILL** can be slowed down to crack corn.

AND THERE ARE MANY MORE FEATURES YOU'LL LIKE!

Every batch you mix saves you money

CONVENIENT TO LOAD. Simply pivot drop feeder to any desired position and load with ear or shelled corn, grain, or any other feed. PTO-powered auger carries feed to 16" hammermill, equipped with reversible, tempered hammers and quick-change screens. Ample room to feed hay bale slices directly into hammermill. After grinding, feed is augered from bottom of mill directly into 95-bu. mixing bin. Flow is smooth and steady, with less dust.

QUICK TO UNLOAD. Swing 10' unloading auger to any desired position alongside, over bunk, bin, or self feeder. Tension on auger pivot holds auger in position as it unloads feed. Augers, mill and mixer can be operated separately. By grinding and mixing your own feed on your own farm, you save feeding costs. Prepare as much feed as you want, how you want it, when you want it and where you want it.

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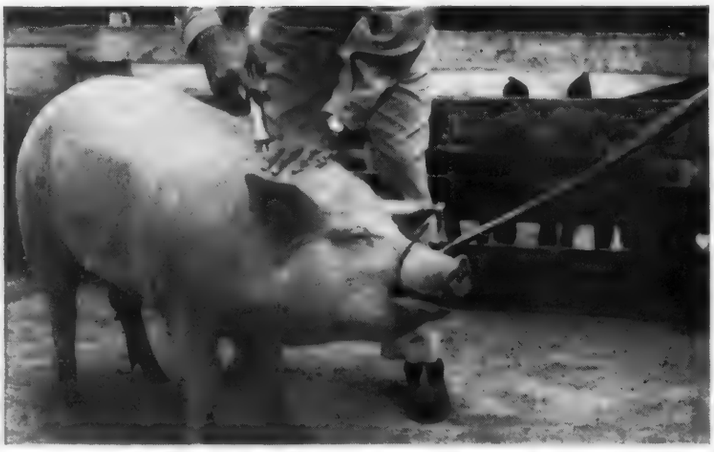
FARMHAND DIVISION OF DAFFIN CORPORATION

HOW TO MOBILIZE AGAINST YOUR BIGGEST RISK TO HOG INCOME

That risk is disease. This coordinated, feed-health program prevents diseases from establishing "beachheads" on your farm. It's a practical program! Follow it step by step and you'll see.



1. Start the fight against disease before breeding. Have your veterinarian blood-test for brucellosis and leptospirosis. One month before breeding, vaccinate for hog cholera with ROVAC® Hog Cholera Vaccine — for erysipelas with DUOVAX® Erysipelas Bacterin and for leptospirosis with LEBAC® Leptospira Pomona Bacterin. If testing shows lepto, feed 400 grams of AUREOMYCIN® per ton of total ration for 14 days to reduce abortions and mortality of new-born pigs.

2. Strengthen farrowing sows when they need it most. Always feed a good formula feed containing 200 grams of AUREOMYCIN 7 to 10 days before farrowing and 7 days after farrowing. You will have healthier sows that farrow more easily and produce more live, sturdy pigs. AUREOMYCIN helps eliminate bacterial infections from sows and their surroundings. Because AUREOMYCIN is absorbed by the sow, some of its power is passed along to pigs in the sow's milk.

5. Getting pigs off to a good start. Your starter feed is the most important swine feed you buy. It protects your pigs at the most critical period. Stresses such as moving, handling, weaning, vaccination and bad weather often lead to bacterial infections. Be sure your starter feed contains AUREOMYCIN at 100 grams per ton of feed. AUREOMYCIN prevents scours, saves pigs, helps eliminate runts.

6. Don't risk hog cholera and erysipelas. Don't gamble with these two costly diseases — make vaccination a "must"! Vaccinate (at 6 to 7 weeks) for hog cholera with ROVAC and — at the same time — for erysipelas with DUOVAX. ROVAC is a safe vaccine that provides long-lasting immunity to hog cholera. DUOVAX gives solid immunity to erysipelas.Keep pigs on starter feed for at least one week after vaccination.

Half-way measures are just not enough! Pork producers need to go all-out . . . to *mobilize* every resource to guarantee a profitable hog operation.

This means selecting top-quality, blood-tested breeding stock. It means using good formula feeds, good management, housing and sanitation.

It means getting out there *every* day and "looking over" the entire herd to spot signs of disease. It means moving fast to close loopholes. It means being alert to *sense* the presence of disease even when you can't *see* it.

Disease, visible or invisible, is by far the biggest risk to profitable hog raising. It can smash you at any production stage.

Why gamble? You can lick most diseases before they start by following the coordinated, step-by-step plan shown on these pages.

This feed-health program is practical, easy-to-do and money making. It gives you this powerful *double-punch:* (1) Good formula feeds, *and* (2) the proper vaccines and medications. It shows you how to make them *work together* so that disease never gets a foothold in your herd.

Study each important step in this Coordinated Feed-Health Program. Discuss it with your feed man. Ask him for a free folder giving down-to-earth, how-to-do-it information on this swine feed-health program. If he doesn't have one, write direct to: American Cyanamid Company, Agricultural Division, Princeton, N. J.

3. Preventing baby pig anemia is easy. The one essential element lacking in sow's milk is *iron.* You supply this element, prevent anemia and obtain faster weight gains when you inject pigs with PIGDEX® Injectable Iron at 2 days of age. At the same time, give your pigs one dose of AUREOMYCIN PIG-DOSER. In this way, you provide the wide-spectrum antibiotic to pigs at the earliest moment, before they start eating a dry feed — to help prevent scouring and keep baby pigs thriving.

4. Keep sows milking well. During lactation, your sows need plenty of energy, proteins, minerals, vitamins and AUREOMYCIN to maintain the strength of themselves and their pigs. Feed AUREOMYCIN in a well-fortified lactation ration at 50 grams per ton of total feed. This will keep sows healthy and reduce bacterial infections. Your sows will furnish more milk and more nourishment for pigs. And AUREOMYCIN will continue to hold down contamination on the premises.

7. How to insure low-cost gains in growing pigs. You want your pigs *to hold on to their early, healthy gains.* During the 35 to 75-pound period, pigs can still be retarded by bacterial enteritis, atrophic rhinitis, and "unseen" diseases. With AUREOMYCIN at 50 grams per ton of total feed, your pigs won't waste feed fighting these diseases — they'll *use* their feed efficiently to put on maximum gains at low cost.

8. Final step: market more top-quality hogs earlier. To avoid set-backs and save up to 40 pounds of feed during this final period, provide a supplement that will supply 50 grams of AUREOMYCIN per ton of total feed whenever trouble shows up. This protects against subclinical diseases, bacterial enteritis, atrophic rhinitis and cervical abscesses — keeps your hogs healthy. You market more top-quality hogs.

The label instruction on Cyanamid products, and on products containing Cyanamid ingredients, are the result of years of research and have been accepted by Federal and/or State Governments. Always read the labels and carefully follow their directions for use.

CYANAMID

COORDINATED FEED-HEALTH PROGRAM

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

on balers. Leave an opening at the bottom to allow trapped moisture to escape. Plain plastic covers will tear and burn more easily than the others, but are cheaper.

Farm buildings. Exteriors—Corrosion of galvanized roofing and siding is best controlled by cleaning and painting with a single coat of gray zinc dust-zinc oxide paint when corrosion first shows. This paint is also a good primer coat, a necessity if a final coat of colored or heat-reflective white is desired. Detergent and water, turpentine, mineral spirits or naphtha are recommended for cleaning the new metal. Portland cement paint or a similar *oil vehicle* cement paint will give a one-coat job for light and heat reflectance and limited corrosion control. Avoid cheap cement paints which may etch the zinc coat. Six months or more of weathering is required before most new galvanized sheets can be painted. Aluminum corrodes little unless it is in contact with other metals in which case it usually becomes the anode and will begin to deteriorate. Use only aluminum nails with plastic washers for fasteners and prevent aluminum from touching other metals, such as downspouts or framing. Detergents and water or solvent-type cleaners can be used. The value of aluminized and galvanized steel depends on the thickness of the coating of aluminum zinc. Coated with the same thickness, zinc will usually outlast aluminum, but, today, the aluminum coating is usually a thicker one and will last perhaps 4 times as long as the normal galvanized steel. It is somewhat more expensive than galvanized steel, but cheaper than aluminum and need not be protected from contact with other metals. Metal buildings should have cement curbing or wood siding to raise the metal at least four inches off the ground to prevent corrosion from the soil. Keep corrosives such as manure, urine, fertilizer, plant and animal sprays, and disinfecting solutions away from metal. Use wooden side rails and posts to prevent cattle from rubbing metal siding and framing. Corrosion of aluminum and aluminized steel is hastened by ammonia fumes and cement. Interiors—Trapped moisture is the main cause of corrosion indoors. A dairy cow will breathe more than 2 gallons of water into the air a day. Unvented space heaters exhaust moisture. For corrosion control (and livestock health) ventilators should provide at least 1 square foot of roof opening for every 400 feet of floor space in livestock buildings. Distribute air intakes around the building. These should have twice the total open area of the roof ventilators. Keep litter dry and one side of livestock shelters open, even in winter. Use fans in tight, well-insulated buildings where it may not be practical to provide openings for natural ventilation. A fan of 1,600 cu. ft. per minute capacity will provide adequate air for a building housing 13 daily cows, 400 layers, or 100 feeder hogs, under average conditions. Beads of condensed "sweat" or frost inside buildings warn that trapped moisture is feeding corrosion. Maintain structural metals indoors as on the outside. This is particularly true of all kinds of metal silos.

Water systems. Plumbing encourages corrosion. It often consists of connected dissimilar metals carrying an electrolyte (water). The corrosion resistance and ease of installation is making copper the standard in new systems. Heavy duty copper (type K) will last 40 to 100 years on the average. Plastic pipe will not corrode. It is usually limited to cold waterlines where the pressure does not exceed 52 pounds in a 2-inch pipe. If it carries drinking water it should bear the National Sanitation Foundation seal. Galvanized iron pipe in normal soils will last at least 30 years, and up to 100 if there is no internal corrosion. Ground waters (wells and springs) often contain copper-corroding ammonia and free carbon dioxide. Copper pipe may not be feasible in areas where water concentrations of these compounds are extremely high. Many potentially corrosive properties of water can be determined in a laboratory water analysis. The sample should be tested as soon as possible after it is drawn. Copper pipe will corrode externally in high sulfide soils or cinders. Non-conductive joints (dielectric unions), sacrificial anodes and inhibitor feeders can help to control corrosion of galvanized iron plumbing. Water carried by copper plumbing will cause corrosion in iron pipes. Dielectric unions are rubber or plastic couplings used to separate

(*Continued on page* 167)

Now one 5-ton load spreads one acre!

New Holland 475 Spreader handles huge loads easily—gives finer spreading

One fast trip with the tractor-drive "475" does the work of two small-capacity spreaders! Giant capacity—175 full bushels, 5 full tons. You can now fertilize far-out fields you've neglected. Check these quality features:

- **Science-designed Cyclon-Action** gives you finer shredding, faster spreading, with correct ratio of apron, beater and widespread speeds. New widespread breaks up manure even better.
- **Tough widespread paddles** are specially heat-treated to take day-in, day-out punishment.
- **Heavy-duty apron chain** withstands more than twice the pull of ordinary apron chain. Ends chain trouble.
- **Full protection**—shear-bolt on apron drive plus slip clutch in power line help eliminate unnecessary repair bills.
- **Built to last** with Meta-Life protected steel sides, Penta-Cote treated wood flooring.

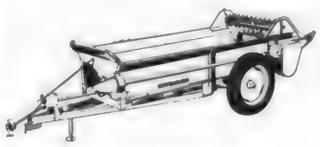
"Those paddles are built to last! Give more uniform distribution, too."

"And you control everything right from the tractor seat!"

475 Spreader cuts spreading time in half because it spreads twice as far!

- **Tractor-seat controls** give you instant selection of 4 apron speeds right from your tractor seat.
- **Extra-long hitch channels** and extra-wide axle support. You haul big loads at higher speeds day after day without breakdown.

Ask your New Holland dealer to demonstrate the "475" on your farm; check his flexible finance plan. *FREE BOOKLET:* write New Holland Machine Company Division of Sperry Rand Corp., New Holland, Pa.



Model 331, with 130-bushel capacity, has most of the quality features of the "475."

NEW HOLLAND *"First in Grassland Farming"*

FLYING'S FUN, TOO!

ALL-NEW PIPER CHEROKEE, first four-place plane in the low cost field to offer modern low wing design for exceptional stability . . . gentle flight characteristics . . . outstanding visibility . . . "air cushioned", almost automatic, landings. All-metal, simplified construction for unmatched maintenance ease. Carries four in the largest cabin of any aircraft in its class, with lots of space for supplies or personal luggage. Choice of two completely new Lycoming engines, 150 or 160 hp. Most advanced, best all-around aircraft in the low cost, four-place field.

FLYING FARMERS FIND

flying's not only useful, it's fun, too!

FLYING turns a few hours or a few days into a wonderful holiday for you and your family . . . an exciting change of pace that, in a few minutes, leaves workaday problems far behind. Travel becomes so swift and easy, you can frequently visit distant friends or relatives, children away at school. They're "right next door" when you shrink the miles with a swift-moving Piper.

And the fun's just begun! In your own Piper you can make exciting trips to really faraway places . . . Florida, Alaska, Mexico, the Caribbean . . . in first-class comfort with budget economy, and so quickly, easily, safely.

You'll never tire of the fun of flying, so easily learned, so rewarding every time you take the controls. The wisest and happiest investment you can make is in a Piper — the best workhorse for farm and ranch; the most fun when work's done.

PIPER ALSO OFFERS THESE OTHER FINE PLANES FOR FARM AND RANCH

AZTEC. Cruises over 200 mph, with amazing short field ability. Carries 2025 pound useful load. Chosen for utility use by U.S. Navy.

APACHE. World's most economical twin-engine aircraft. Carries 4 or 5 at 170 mph cruise. Noted for stamina, reliability. Powered by two 160 hp Lycoming engines.

COMANCHE. Handsomest, roomiest in its class. Holds three world nonstop distance records. Cruises 181 mph with 250 hp engine; 160 mph with 180 hp.

SUPER CUB. A "go-anywhere" utility plane. Takes off and lands in 100 yards. Cruises 115, flies as slow as 45 mph. Ideal for spotting.

PAWNEE. Most advanced agricultural duster/sprayer. Scientifically designed for pilot safety, efficiency. Economical to operate. Carries 800-pound chemical load.

Here's an ideal economy farm and ranch plane —

the new PIPER COLT — *first "compact" of the air.*

Gentle in flight, spirited in performance, the 108 hp Piper Colt is the ideal economy plane for farm and ranch operation. Cruises 115 mph, with 18-20 miles per gallon. So easy to fly, so safe for beginners. Two-place, side-by-side seating with big, roomy cargo space. See it, try it. You'll want to fly it home.

CAPITAL-CONSERVING LEASE AND FINANCE PLANS AVAILABLE

PIPER AIRCRAFT CORPORATION
Lock Haven, Pennsylvania

Please send me literature on:

- ☐ Piper Aztec
- ☐ Piper Apache
- ☐ Piper Comanche
- ☐ Piper Cherokee
- ☐ Piper Super Cub
- ☐ Piper Pawnee
- ☐ Piper Colt
- ☐ "Learn to Fly" Programs
- ☐ All Piper Aircraft
- ☐ Lease/Finance Plans

Name_____

Address_____

Q-5

MORE PEOPLE HAVE BOUGHT PIPERS THAN ANY OTHER PLANE IN THE WORLD

In California a single dairy may milk over 1500 cows a day. They're milked around the clock in 8-hour shifts. Speed is essential. So dairymen need fast and clean milking. They want a pipeline milker that's gentle on cows—that won't create mastitis problems. And they want equipment that's reliable and trouble-free—that will withstand almost-continuous use. If you're thinking about a pipeline system, you should read...

why more California dairymen buy a De Laval Combine Milker than any other pipeline

Pick the pipeline that *does more* than save time and labor. California dairymen do; in fact, more dairymen in the U.S. buy a De Laval Combine Milker than any other pipeline.

WHY DAIRYMEN PREFER DE LAVAL

Better milking is the big reason. Of all pipelines, only De Laval delivers fast, clean and gentle milking. Fast and clean milking is important because it gets you *all the milk* your cows can produce. Gentle milking is important because it keeps cows healthy... helps prevent udder troubles that knock cows off the milking line and cut production.

WHY DE LAVAL MILKS BETTER

Most dairymen may not know just why De Laval milks better than other pipelines. But they sure like the results. Actually, De Laval's secret of fast, clean and gentle milking comes from three features—narrow-bore liners, absolutely uniform pulsation and a rotary vacuum pump that recovers vacuum almost immediately. Other milker manufacturers have been trying for years to copy these features, but no one has come close to doing it. Yet a Combine Milker costs no more than other pipelines!

RELIABLE, TROUBLE-FREE SERVICE

California dairymen know the value of reliable, trouble-free equipment. They can't afford to fool around with equipment that's always breaking down. Neither can you. That's why you should not overlook the reputation of the company behind the product when you buy a pipeline milker.

CHOICE OF ALL SYSTEMS

De Laval offers all systems—herringbone, walk-thru, side-opening or U-shape parlors, and around-the-barn systems. There's a Combine for every budget, every herd size. And you need only 10% down!

Contact your De Laval Dealer for an honest estimate of the cost to install a Combine on your farm. He'll give you a top-dollar trade-in allowance on your bucket milkers—and you can put this towards your down payment. The De Laval Separator Co., Poughkeepsie, N.Y.; 5724 N. Pulaski, Chicago 46, Ill.; 201 E. Millbrae Ave., Millbrae, Cal.

...10% down, up to 4 years to pay.

DE LAVAL

◄ Largest Guernsey dairy in the world uses a De Laval Combine Milker. Adohr Farms, Camarillo, California, milks approximately 2200 cows every day.

DE LAVAL COMBINE MILKER*

*Combine Milker is a registered trademark of The De Laval Separator Co.

The Dairy Barn

Artistic Inseminator The other day Joe Hutchison, one of the COBA inseminators in Ohio's Geauga County, stopped in the office. After some talk about his work, Joe mentioned he has been doing livestock art for years and regularly has presented a portrait of the Grand Champion steer at the International to the winning exhibitor. He said that these days he's come to appreciate dairy animals as his models, and who can blame him? A dairy cow makes a fine cover girl. In fact, she's good on any page. The scene of cows contentedly munching a mouthful of hay, which Joe painted near his home in Burton, Ohio, proves the qualities of both models and artist.

Joe Hutchison's livestock paintings are almost photographically realistic. As an inseminator, he knows dairy cows inside and out.

Joe is sure some dairymen suspect the inseminator is busy painting pictures or hitting golf balls if he doesn't walk into the barn the minute a farmer reports a cow in heat. "Actually," Joe said, "while a cow's in standing heat it's too early to inseminate. Of course you don't tell a bull that, but research shows artificial breeding is successful from the latter part of standing heat until 24 hours after standing heat. There's a wide range of time during which the cow can be settled artificially. The egg is not ready to be fertilized until 12 hours after standing heat, and sperm inseminated earlier tend to lose their vigor. For the best results, a farmer should call the inseminator when the cow is in standing heat—not before. Then the inseminator's basic schedule applies. If the call comes before 10 in the morning, breed her that afternoon. If the call comes later, breed the next morning. This schedule is based on experience. The inseminator doesn't want to make a second call any more than a farmer wants a repeat breeder."

No Fallout Trouble Following the Russian atmospheric tests, fallout levels in many areas of the Midwest and South have risen to record levels. What effects might high fallout have on cattle? The Atomic Energy Commission reported last year that a herd of Herefords had grazed on the world's worst fallout area for two years without ill effects. The spot is a 600-square-mile area near the Nevada proving ground, where much of the U. S. atomic testing has been done. There were almost 100 atomic explosions from 1951 until the agreement to stop tests about three years ago. There have been several since tests resumed.

The Commission could find no obvious physiological damage and no genetic effects on the cattle grazing in this area. Nineteen cattle were slaughtered, and analysis showed only normal amounts of strontium 90 in their bones. The cattle have bred normally, there has been no increase in diseases, and a U. S. Army veterinarian from Las Vegas pronounced them "in a satisfactory state of nutrition."

Appetite Trigger Dairy science researchers at the University of Kentucky believe they have part of the answer to the question "What makes a cow stop eating?" And it's not necessarily because the cow is full. The reaction is tied up to production of two short chain fatty acids in the rumen. The two are acetic and propionic acid. When the acids build to certain levels in the cow's blood, something tells her to stop adding feed to the rumen—she's had enough. The experimenters found they could inject either of these two acids directly into the blood and make a cow stop eating long before her identical twin, without the injection, felt she was full.

The level of blood acids that causes the appetite to dwindle varies from cow to cow. Lactic acid and butyric acid have no effect on the appetite. So, if the rumen bacteria produced less acetic and propionic acids, a cow might eat more. This basic research may be a step toward more efficient dairy cattle.

Farm Books

Agricultural Engineers' Handbook, *edited by C. B. Richey, Paul Jacobson and Carl W. Hall, McGraw-Hill Book Co., New York, $19.50.*

Forty contributors, and more than eight hundred pages, make this book a mine of information on many phases of agricultural engineering. The book is an odd combination of theory and practice—a theoretical analysis of a hayrake on one page, a discussion of haying methods two pages later.

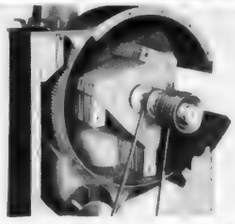
The book is mainly a reference work. There are tables on practically everything, from the water capacity of corrugated pipes to the major causes of fire loss in Iowa. It even gives plant populations at various row spacings.

—J.J.M.

Roosevelt's Farmer, *by Dean Albertson, Columbia University Press, New York, $6.00.*

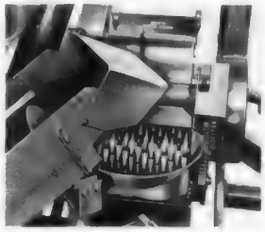
In June, 1933, Claude R. Wickard was a debt-burdened corn and hog farmer from Carroll County, Indiana. On September 5, 1940, he became the twelfth Secretary of Agriculture. The story of Wickard's life is one that might have been copied from Horatio Alger—the struggle against poverty on the farm as a boy, the fight for a college education, the enlargement and conservation practices on the farm against the odds of the agricultural depression that lasted from 1920 until he gave up farming, and the final triumph as a member of Roosevelt's cabinet during the war years. As such, it is interesting reading. But to most farm readers, the re-

(*Continued on page* 145)

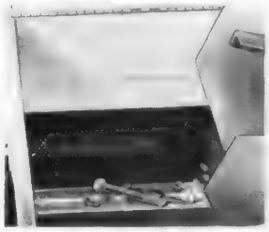


15-INCH MILL with big grinding chamber and long screen gives big capacity and more uniform grinding than any other mill. Thin, sharp alloy steel hammers grind feed downward against a heavy steel grinding plate. 10-inch model also available.

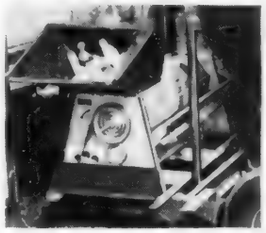
LOW-MOUNTED CONCENTRATE HOPPER for easy addition of concentrates or feed additives. Simply pour additives directly from bag to hopper. Thorough mixing with the feed is obtained automatically. Bag guide prevents bag from being caught in auger.



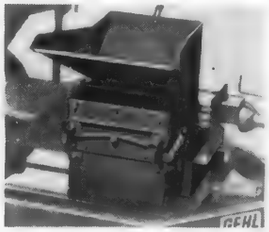
CRUSHER-FEEDER SPEEDS GRINDING. Grinding ear corn is a snap with the auger and optional crusher feeder. Four-speed auger lets you select a speed to keep the mill full, handles ear corn as easily as shelled corn or oats.



MAGNET KEEPS HARDWARE OUT of the feed. Mix-All's optional magnet keeps all metal materials out of the feed. From smallest bits of sheet metal to the heaviest bolts, damaging hardware is trapped before it reaches the hammermill.



OPTIONAL HUSKER-SHELLER nearly doubles feed-mixing possibilities. Attach sheller shaft to mill drive... shovel ear corn into the hopper. You get instant shelled corn delivered to the mill for grinding or the concentrate hopper for direct mixing.



ROLLER MILL AVAILABLE with the Gehl Mix-All. Here's the perfect combination of feeding equipment if you like to roll grain instead of grinding it. Sturdily built roller mill replaces the hammermill ...you get all the Mix-All features plus roller mill advantages.

GEHL MIX-ALL

PAYS FOR ITSELF

Thousands of feeders have already proved to themselves that the Mix-All pays for itself. And every day, more and more cost-conscious, profit-minded farmers are buying the Mix-All to lower their feed costs, without sacrificing either economical rate of gain or feed quality. The Gehl Mix-All can be a cost-cutter for you, too.

With a Gehl Mix-All, you'll reduce feed costs. By using your own grain, you can be sure of its quality. You can easily mix supplements, antibiotics or additives with your grain. Put 'em all in the Mix-All and let 'er go. You get a top, commercial quality feed every time... and at far less than it costs you to haul your grain to town, wait while it's ground and mixed, then haul it back again.

For complete feed-service convenience, you just can't beat the Gehl Mix-All. It grinds, mixes and delivers the feed. There's no need to wait for feed grinding and mixing service. You mix the exact amount of feed you need, whenever you need it, then haul it where you need it and unload with PTO power.

See the Gehl Mix-All in action. Ask your dealer for a Mix-All demonstration right on your own farm. Then buy a Gehl Mix-All and join the other thousands of feeders who've found a Gehl Mix-All the perfect way to lower feed costs and increase profits on every type of livestock feeding.

34-61

GEHL
102 YEARS OF SERVICE

GEHL BROS. MANUFACTURING CO.
Dept. ML-21-34, West Bend, Wisconsin

Please send me complete details on the Gehl Mix-All.

NAME .....

ROUTE ..... TOWN .....

STATE ..... ☐ I am a student

cows are not camels

Nor can they go seven days without water!

The desert nomad requires only an occasional oasis to fill his camel's need for water. The modern farmer requires a constantly available supply of clean, fresh water.

A dependable Myers pump will deliver the water for all your farm needs—quietly, efficiently and economically.

Why not call your nearby Myers pump dealer today?

Myers **The F. E. Myers & Bro. Co.**
ASHLAND, OHIO KITCHENER, ONTARIO
SUBSIDIARY OF THE McNEIL MACHINE & ENGINEERING CO

COLE'S SPEED PLANTER CUTS PLANTING TIME

Large duplex seed hoppers and seed plates—½ bushel capacity. 2—80 hole elevated seed plates, originated by COLE, reduce seed bruising. **Sword or twin disc openers** with new sealed bearing. **Zero pressure rubber tire wheel**—for better traction and throwing off heavy wet soil. **Fertilizing unit**—places fertilizer accurately in one or two bands. Maximum capacity—2500 pounds per acre. New side placement discs place fertilizer on either side of row.

Designed for flexibility—One or multiple row. For tool bar, cultivator frame, and tractor mounting. Interchangeable grain and cotton hoppers. 22" minimum row width. Complete line of seed plates. Large range of seed spacings. Side dress by removing planters. Full floating planter operating independently with low hopper for accurate depth and spacing. Close coupled units. Trouble free drive. Adjustable spoon coverers. Overseas Distributor: ASGROW SEED CO. INTERNATIONAL.

COLE

SERVING FARMERS SINCE 1900

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Dept. QW-2, P. O. Box 9216, Charlotte 5, North Carolina

Please send full information on Cole planting and fertilizing units checked.

☐ 4-row ☐ 2-row ☐ 1-row Make of my tractor_____

Name_____

Address_____

Town_____ Zone____ State_____

EXCLUSIVE ONE-PIECE CAB-BODY design gives Ford Styleside pickups extra capacity, extra strength. Heavy-duty in every way for heavy going all day!

THEY'RE HERE! NEW FORD FARM TRUCKS FOR '62

Get full-time economy that only starts with Ford's low price!

Meet the trucks that make saving money a full-time business—new Ford Trucks for '62!

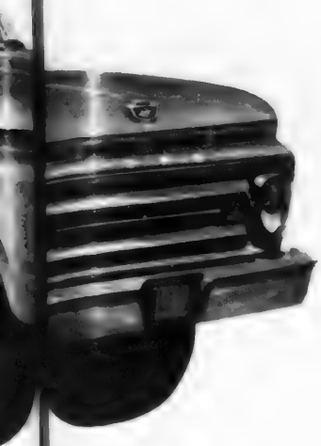
They save on price. They save on gas and oil. They save on tires and on maintenance—wherever there's a way to save! The full record of Ford economy, covering three years of independent tests, is detailed in Ford's Certified Economy Reports. See your Ford dealer now. Check out the facts, work out a deal, and drive out a truck that saves money . . . full time!

FORD TRUCKS COST LESS

SAVE NOW... SAVE FROM NOW ON!

FORD TRUCK CERTIFIED ECONOMY REPORTS

ECONOLINE—ALL-AROUND ECONOMY LEADER—and low price is only the start! Certified tests show this pickup can save $100 on gas, oil and tires over your present conventional pickup in every 16,000 miles it is driven.



NEW FORD 4-WHEEL-DRIVE MODELS. Extra get-going, keep-going traction for mud, sand, snow. Both Flareside and Styleside body styles are available.

NEW FALCON RANCHERO—smartest saver that ever packed a load! Here's all the clean good looks, the ride and handling ease of a Falcon car—at a price that's Falcon-low! 800 lbs. capacity.

NEW BIG SIX ENGINE FOR FORD MEDIUMS includes more heavy-duty engine features than any other Six of its size. Never before such long-term durability, reliability and economy at so low a price!

PRODUCTS OF Ford MOTOR COMPANY

When you *really* want results ask for potent Terramycin

BRAND OF OXYTETRACYCLINE

More meat with Terramycin

Small amounts of Terramycin in beef feeds help produce more gains per day and send animals to market faster.

A summary of Terramycin growth trials, both high and low roughage, shows:

- Terramycin in the feed increased growth in 9 out of every 10 trials.
- The increases averaged 8.26%.
- To break even* on using Terramycin costs, all you need is a 1.2% increase in gain—less than ⅙ as much as the average reported above.

Less feed per pound of gain

The same studies also showed:

- Terramycin reduced the amount of feed needed to produce a pound of gain in 16 out of every 17 trials.
- The improvements averaged 7.45%.
- To break even* on using Terramycin in the feed, all that is needed is a 1.3% increase in feed efficiency—less than ⅕ as much as the average reported above.

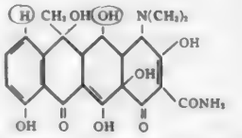
Greater disease control, too

Terramycin in *one or more of its product forms* is an aid in the prevention, treatment or reduction of losses associated with

- anaplasmosis
- scours (also known as infectious enteritis white scours** salmonella infections black scours bloody dysentery bacterial diarrhea bacillary infections associated with virus diseases)
- leptospirosis
- setbacks at times of stress
- respiratory diseases pneumonia bronchitis pleurisy shipping fever (Also known as hemorrhagic septicemia, stockyards pneumonia)
- navel ill
- nephritis
- metritis
- wound infections
- secondary infections**
- liver abscesses
- malignant edema
- blackleg
- calf diphtheria

***due to Terramycin-susceptible organisms*

The potency-protected molecule makes the difference



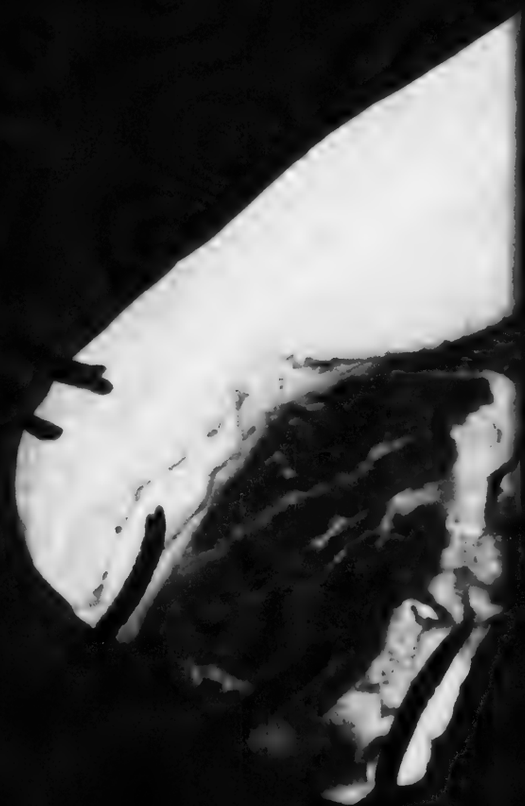
There is a difference in antibiotics. And Terramycin has an important one. It's the only commonly used broad spectrum farm antibiotic with the unique hydrogen-hydroxyl pair (circled at right) that helps protect stability . . . helps you make sure you get the potent antibiotic you paid for.

Ask for potent Terramycin—in your feeds, drinking water treatments, tablets, injections or mastitis treatments. Rely on your veterinarian for accurate diagnosis and treatment of disease.

**Based on total feed costs of $37.79 per ton, a feed efficiency of 12.12, a market price for cattle of 25¢ per pound, and 75 mg. of Terramycin per head per day.*

Chas. Pfizer & Co., Inc., New York 17, N.Y.

Science for the world's well-being®



Pfizer

By Norman Reeder

IRRIGATION IS

"THE WORST DROUTH YEAR I remember was 1934. Our wheat went three bushels to the acre. Corn got about hip-high, then in August it just fell over. We didn't get an ear that year. We bought some prairie hay to keep our cattle alive until the Government took them off our hands at $14 a head."

Fred Fastenau dismissed these recollections with a puff on his pipe. Since 1941, when they turned the water into the newly-dug irrigation ditch to serve the area around Bertrand, the dread of drouth had passed into history for him. In the years since, he has been capitalizing on every advance in corn-growing science and considers a corn crop that doesn't average 100 bushels a failure.

Fred Fastenau is a rangy, rugged man who is not in the habit of backing off from tough decisions. When he started farming in the thirties there wasn't much to build confidence or hopes on—not until 1938, when he signed up 140 acres for irrigation. The water was promised for delivery three years later. Today, he and his son Keith farm 700 acres of cropland, have cattle on another 400 acres of rough pastureland. Between them they are growing 400 acres of corn and milo under irrigation, another 50 acres of milo on dryland, plus wheat, alfalfa, clover and forage sorghum. By meeting trouble head-on through the years, this man has come a long way.

Now, in mid-July, 1961, he was pondering a new problem resulting from 20 years of cropping this fertile land in central Nebraska to continuous corn. His problem of the moment was that routine treatment with regular soil insecticides had not kept rootworms in check. Holding a stalk as big as the grip on a baseball bat, but almost bare of roots, Fastenau was considering a new and drastic treatment—airplane spraying with parathion. This is a heavy gas that settles into the soil. There was enough evidence that it would do the job. But anyone is warned to stay out of the fields for 72 hours after this treatment. The gas could kill a man. Cattle had to be moved out of danger.

His decision on parathion was typical. He ordered the airplanes up. It worked. Corn put out new roots. Again, for the 21st year, the land where corn failed for lack of moisture in 1934 and 1939 and 1940 produced a magnificent crop.

Moisture Is the Gamble

Where the Fastenaus farm, the rainfall averages about 25 inches a year. This would be enough for a good corn crop if the summer rains came at just the right time, and if there were not too many days like one in early July this year when the thermometer stood at 104 and the humidity was six percent. Twenty-five inches is the average. In half the years it's less. Chances of rain enough, in time, are too poor to gamble on with farming methods of humid regions to the east. This is what drove the settlers to invent dryfarming in this land of the sodhouse and the lister. Wheat one year, then a year of fallow to be reasonably sure of moisture for the next crop. Corn in sparse stands, the kernels placed in furrows where the roots could be buried deeper and deeper through the season.

In an average year, dryland corn will make perhaps 30 bushels to the acre. In years of good summer rains dryland stands produce

CROP INSURANCE

up to 45. In a real dry year there is no crop. Shooting for big yields with thicker planting, a lot of fertilizer, insecticides and herbicides, might work in a rare season. The odds are against it.

But the soil is unsurpassed. This is prairie land. When the settlers came it was covered with tall grass—no trees except along the water courses. Through the ages rains were trapped in the upper few feet of soil where the fine grass roots wasted little moisture. The wind-laid clay particles of these loessal soils, some places 50 feet or more in depth, suffered next to no loss of fertility through leaching. What was created from the parent material through several thousand years, accumulated. Soil tests on many Nebraska farms still reveal a wealth of available phosphorus and potassium where not a pound of fertilizer containing these elements has been applied. On many farms, only the nitrogen carried off in crops must be replaced to get top yields—granted that the moisture for top yields is supplied. On other irrigated farms nitrogen and phosphorus are needed, as well as some zinc and sulphur.

After the native grasses, wheat is the most dependable dryland crop. Its greatest need for moisture comes in early summer while it can still draw on subsoil reserves from melting snows and spring rains. Grain sorghum (milo) is more dependable than corn because of its unique ability to stop growing and wait out a few weeks of drouth, then come on with eventual rains. But milo, too, needs generous watering to make its best yield. At least double the crop made on dryland is par for irrigated fields.

Alfalfa goes deep for moisture, but it is such a thirsty crop it sometimes takes 10 or 15 years to restore the moisture in deep soil layers after dryland alfalfa is plowed down. Nebraska's famed production of dehydrated alfalfa meal is based in the Platte Valley, where the crop is sub-irrigated by the high water table.

So the Nebraska dryland farmer's first choice of crops is wheat. Allotments permitting, many would grow nothing else. Milo is second choice, a crop for diverted acres. But with irrigation to insure the needed moisture, farmers like Fred and Keith Fastenau can take their pick of crops grown in the humid parts of the Middle West: corn alfalfa, sugar beets (if they can get allotments), soybeans, plus almost any vegetable crop for which there is a local

Fred Fastenau starts a siphon tube pouring water down a corn row. The plastic dam can be adjusted to hold the water level in the ditch. Irrigation and continuous corn have also brought problems—Fastenau's crop had to be sprayed with parathion to stop serious damage from rootworm.

IRRIGATION IS CROP INSURANCE

In central Nebraska, with an average rainfall of 25 inches a year, irrigation has meant the difference between success and failure for the farmers; life and death for the small towns. Gravity irrigation has been the cheapest and easiest method on the flatlands; sprinkler irrigation makes the best use of limited water. On some rough land, sprinkler irrigation is the only practical solution. All of the corn growing skills of the Corn Belt—plus irrigation—are insuring 100 to 125-bushel yields. Pioneers are now combining minimum tilage methods with irrigation.

market. With irrigation, there is no need for a fallow year between wheat crops.

A New Place in the Sun

In Holdrege, the Fastenaus' county seat, cowboy-booted extension agent Cal Ward said: "Irrigation is a tremendous stabilizing influence in dry years. What it really means to us is the difference between an insured 80 to 120-bushel corn crop and anything from 40 bushels down to failure."

Ward leaned back with obvious satisfaction as he went on. "Farmers have confidence now. They can make long-range plans, borrow capital for expansion. Cattle feeding is coming in. It has doubled in the last five years. There are 40,000 head in Phelps County feedlots this year—mostly lots with 100 to 500 head. Cattle feeding is bound to grow."

Out of 250,000 acres of cropland in the county, 100,000 are now watered. More acres go under irrigation year by year. Optimists predict that eventually 90 percent of the irrigable cropland in Nebraska will be fortified against the hazard of drouth.

Nowhere is there more solid evidence than at Bertrand, the Fastenaus' market town. Bertrand (accent on the second syllable), with 690 population, is today a sun-splashed collection of new grain-handling facilities surrounded by blocks of new houses, a new nine-room clinic with two doctors, a new school, new sewage disposal plant, a bowling alley and a laundry.

Yet Bertrand was literally dying before irrigation. Al Walentine, the dark-haired. busy manager of the bank, put the story in terms of money. In 1939, when the Kingsley family moved their bank charter here from the doomed town of Norman a few miles south, there was no bank. Once there had been two in Bertrand, but neither opened after the bank holiday. A credit co-op, organized to fill the gap, had folded. But the Kingsleys believed that irrigation would bring life back to Bertrand. It would give everybody—themselves included—a fresh start. So they moved here with a scant $5,000 in customer deposits, a surplus of just $4,000. Today the bank has $1,300,000 in deposits, a $50,000 surplus, $67,000 in undivided profits.

"Or you can judge the value of irrigation this way," said Walentine, his eye running over a new loan application just laid on his desk. "The last farm sold at auction around here brought $42,000 a quarter (160 acres). This was an irrigated farm. The last dryland quarter to change hands went for $24,000—an $18,000 difference."

Water is controlled and measured at the canal gate (left). No one but the official ditch rider is allowed to turn this wheel. An ocean of water flows through the tubes (top, right). Different-sized tubes are used to control the flow. Water from the McConaughy Reservoir is carried over hundreds of miles of canals and flumes(bottom, right) to the farms.

The Management of Water

A farmer who makes the switch from dryland to irrigation, as Fred Fastenau did in 1941, must learn a new technique, and one that has some effect on all he has learned previously about making a seedbed, planting, fertilizing and cultivating crops. While the ancient art of irrigation has operated on the same basic principles for 4,500 years, it is by no means simple. An irrigator must contrive to take a huge volume of hard-to-manage water and somehow distribute it evenly to every part of his fields. He must know when and how much water to put on, for too much is wasteful at best; it is actually harmful in some cases.

The management of water is simpler when applied by the sprinkler system—a modern innovation. But sprinklers are seldom used where a gravity system will work. By and large, gravity distribution costs a great deal less and takes less labor. It is true sprinkler irrigation has gained fast in recent years and is sure to be expanded greatly. Sprinklers use water more efficiently; they do a more effective job with the output of small wells; there have been important developments just recently in mechanizing the hard and dirty work of moving pipe. Moreover, there are thousands of acres which could benefit from irrigation where only the sprinkler system can do the job. But this is another story.

The technique of irrigation involves timing with as much precision as the best weed-control methods. In Nebraska, wheat is watered before the crop is planted. The soil is soaked down to about five feet. This one watering may be enough to insure the crop, but in a dry spring, water is turned on again just as the wheat comes into bloom. Alfalfa is watered after each cutting unless rains happily fill the need. Milo is irrigated about the same as corn.

A classic experiment at Scottsbluff, at the dry western end of Nebraska (rainfall 12 to 15 inches), showed that the critical periods in the life of the corn plant—with respect to its water needs—were the pre-tassel and the pre-silk stages. Except in very dry periods, subsoil moisture and rains would see the plants through until the ear shoots start to form. This is most fortunate. It permits the corn grower with irrigation to plow, plant and cultivate with scarcely more complications than confront the farmer in the humid Eastern Corn Belt. The time to turn on water is shortly after corn is laid by. But once corn has grown to the critical stage an irrigator must move fast and skillfully.

To be irrigated by gravity, a field must be planted so that the rows are almost on a level from end to end. A uniform slope of one percent is desirable. However, close-growing crops like wheat can be watered on slopes of four percent; and it possible to get good distribution on alfalfa where the slope is up to six percent.

Thus the level and the transit—not the

(*Continued on page* 146)

MANAGEMENT TO

PREVENTION THROUGH MANAGEMENT is the best control for internal parasites in cattle, sheep and goats. In our animal clinic at College Station, Texas, hardly a day goes by that we are not slapped in the face by two appalling observations. One is the great loss of flesh, and often the death, of livestock infected with worms. The other shock comes with the realization that most farmers and ranchers do not seem to recognize, or show much concern over, this insidious threat to livestock profits.

Occasionally a spectacular case arouses the neighbors. Recent death losses, estimated at about $25,000, occurred in a cattle herd near Houston. Four calves from this herd were brought to our veterinary clinic. All were showing typical symptoms of parasitism. All four died shortly after arrival. Heavy worm infestation was proven on post mortem. In all, over 250 of the 850 calves in this herd died in a few months. The tragedy is that such losses can be avoided so simply.

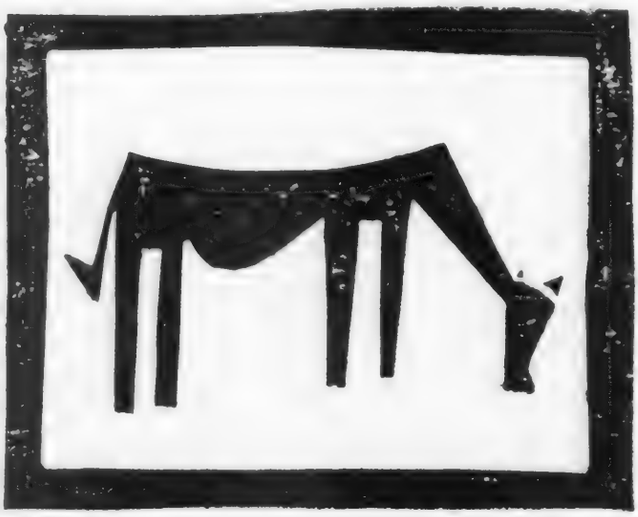
No cattle, no sheep, no goats are immune, although some individuals have greater resistance than others. Few farms are entirely free of worms. Some types of livestock worms are prevalent in certain areas but are rare or insignificant in other areas. Warm, humid climates are most favorable to worm infections. The problem is on the increase because cattle numbers are building up in the warmer states of the Southeast.

D. D. Lightsey, a Burleson County, Texas rancher, recently had a typical experience. He combined several small herds into a 100-cow unit, then added 41 heifers. These, plus new calves, were wintered in 1959 on a piece of bottom ground. Unthriftiness and poor haircoats developed. "I first suspected lice," Lightsey said. "We sprayed for lice but it didn't do any good. The calves were in poor condition and the yearling heifers were worse. I had raised most of the cows myself and never had any trouble before. They all took to scouring badly. I figured then it was the wet grass, since the ground gets flooded. Then they started to die. Someone suspected worms. I wormed them but they continued to die, so I figured it wasn't worms. In no time at all we lost 49 head, 20 of them yearling heifers. By then we had the vet in and he said 'worms' right off. We twice dosed those that were left, put them on upland pasture and fed them cottonseed cake. They showed improvement in a few weeks. We haven't had any trouble since. Earlier I thought they'd never come out of it. I sold 5 head, 4 heifers and a registered cow, for a total of $50, just to get rid of them. Those cattle were so weak they just reeled as they were driven up the alley and into the truck."

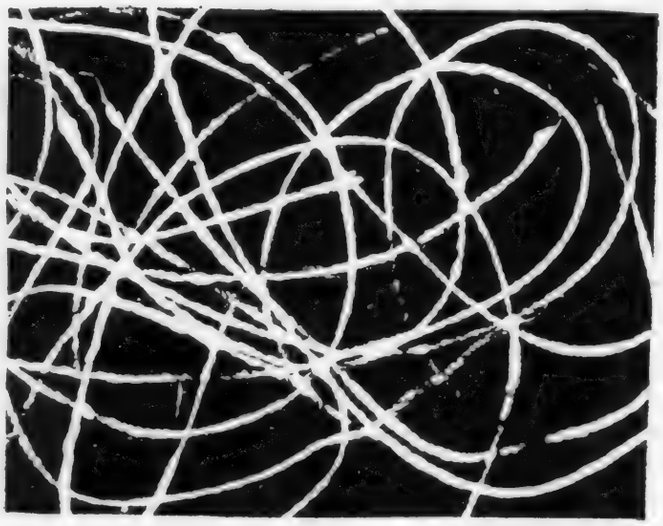
Know the Enemy

As background, remember, a parasite lives at the expense of another being, the host. External parasites, like ticks and fleas, are easily recognized. Internal parasites, stomach worms, for example, are unseen; they are not widely understood, and their danger is often ignored. Livestockmen often consider their animals just "poor

When cattle are unthrifty . . .



always suspect worms . . .



By W. M. Romane, D.V.M.

CONTROL WORMS

doers," when internal parasites are the trouble. Unless an animal dies and a post mortem examination shows parasites are the cause, cattlemen, in particular, refuse to give any thought whatever to these internal, unseen marauders. Sheep and goat raisers, with whom worms are a more serious problem, are more parasite conscious and more aggressive in controlling them.

Coccidiosis is caused by a specific, tiny, internal parasite. Other internal parasites such as liver flukes and lungworms do serious injury. These occur spottily. Such infections are difficult to diagnose or treat and the services of a veterinarian should be utilized in these cases to insure proper treatment.

The more common internal parasites, the nematodes or roundworms, are the ones the farmer and rancher may best control with a good management program. These do the big damage.

Vicious Circle

The life cycle of each kind of worm differs as to particulars, but in general here is what happens. In the stomach or intestines of an infested animal the parasites, both male and female, migrate freely or attach themselves to the stomach or intestinal lining. The female produces large numbers of eggs which pass out in the feces and, under favorable conditions, hatch on the ground in a few hours. The hatched larvae molt twice after which they become infective. The early-stage larvae, if eaten, are soon killed by animal body temperatures, but once the infective stage is reached, the larvae are tough—hard to kill. The interval from egg to infective larva varies from a few days to several weeks. On the ground, the infective larvae require moisture to move about. They crawl up blades of grass wet with dew or rain and are eaten by grazing livestock, the larvae mature inside the animals, then mate. The females lay eggs and the cycle begins over again.

Injury to the health of the animal varies with the kind and degree of infection. Some well-fed cows can harbor great numbers of parasites with little harm. Other cows in the same herd may show severe symptoms from a lesser number of worms. One type of worm might exact little from a sheep's well-being, but another type or a combination of several types might in time have fatal results. Young animals are most seriously affected. So often calves, lambs and kid goats decline in vigor and bloom when weaned. Farmers attribute the decline to weaning itself. More often the lowered nutritional aspect is only a part of the picture. Worms already in the young animal do little harm while sufficient mother's milk is available. When the tap is turned off, the strain on the youngster is twofold. Unless adequate nourishment is substituted for the missing milk the weanling suffers from both malnutrition and worm damage.

A similar vicious circle is set up where pastures are overgrazed or overcrowded. Worms are always present to a degree in some of the stock. The cattle are forced to graze over and over the same

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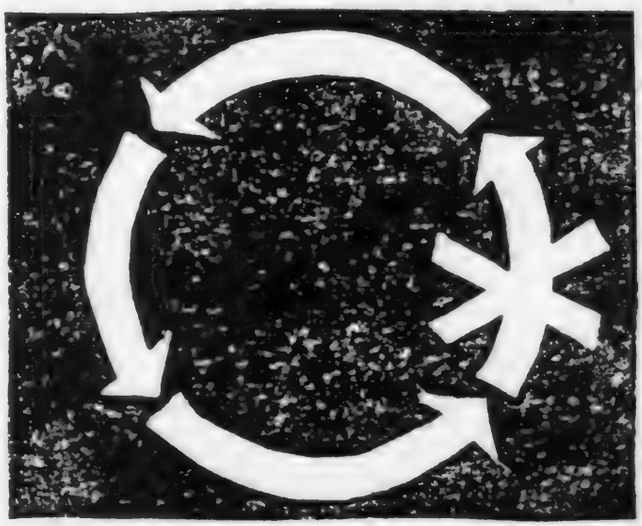
feed well . . . .

and break the worm cycle.



Ventilation and Disease

By David W. Wellham

THE AIR SUPPLY is seldom a critical factor for a dairy herd grazing on pasture. But in a poultry house, with birds packed one or two to the square foot, the air supply is as vitally important as the feed or water. Poultry were the first livestock to be kept in this ultra-confinement. But the problems of ventilation are not alone the problems of poultry. They are the problems of any animal in confinement, so the experiences of the poultrymen are pointers to the future of farm ventilation.

George J. Christie, veterinary pathologist of the Eastern States Farmers Exchange, speaking to the American Society of Agricultural Engineers last June, said, "Some of the most devastating poultry diseases can be controlled only by improved management and better environmental control. One such disease is chronic respiratory disease (CRD), and it is in this area that the services of the agricultural engineers are urgently required.

"Although it is true that CRD is caused by a complex of infections," continued Dr. Christie, "it is highly important to appreciate that these infectious agents can only induce their pathogenic effect in birds so stressed as to lower their natural resistance to disease. It is necessary to work with poultry only a short period of time to realize that the most severe stresses to which birds can be subjected are environmental in nature—extremes of temperature, inadequate ventilation, and excessive dampness."

Last month, in his office in the new Eastern States Co-op building, Dr. Christie outlined the relationship between chickens, air supply and disease. "Before you are going to get a healthy bird, you need to have good conditions," said Dr. Christie. "There are four things to consider: First, the physiology of the chicken demands three times as much air, pound for pound, as any mammal. Therefore, the rate of air exchange has to be three times as rapid in a poultry building. Second, chickens differ from mammals in the manner in which they excrete moisture. A chicken is denied excretion by perspiration; it is denied to a large extent the excretion of moisture by urination. So, by far the major amount of excreted moisture is found in the expired air.

"Third, by virtue of the type of manure deposited in the litter, and the generally crowded conditions, you get a very rapid build-up of free ammonia. This free ammonia is an extreme irritant to extremely sensitive mucous membranes, particularly to mucous membranes of the nose, throat, lungs, air sacs and even the eye. In fact," added Dr. Christie, parenthetically, "a well-known keratitis of the eye is caused by excessive ammonia in the atmosphere. It is only logical to assume that this irritation can happen in the respiratory tracts, creating conditions ideal for CRD.

"The fourth influencing factor is the amount of carbon dioxide in the air. As the carbon dioxide content of the air increases, it stimulates the respiration center in an animal's brain to an increased rate of breathing. If the carbon dioxide content of the air in a chickenhouse increases, the cycle begins in which the chicken breathes more rapidly and, therefore, breathes in more ammonia and other undesirable gases. In fact, we can cause gasping artificially by administering carbon dioxide.

"Here, then," said Dr. Christie, "are four factors leading to diseases, especially respiratory diseases, in the absence of adequate ventilation."

Good Ventilation

It is much easier to outline the many unpleasant results of poor ventilation than it is to define the exact requirements of good ventilation. A good ventilation system must: (1) remove all undesirable gases and moisture, (2) without drafts, (3) without wide fluctuations in temperature, and (4) maintain a temperature that is not wasteful in feed.

The last item is an important one. It is well known that animals must eat more in cold weather to keep themselves warm. Perhaps the similar loss of feed efficiency at the other end of the temperature scale is less widely known. USDA tests, however, have shown that a 100-pound hog needs nearly twice as much feed to produce a pound of gain at 90° than it does at 70°. For a 200-pound hog it takes three times as much feed at 90° as at 70°.

Unfortunately, the same air movements which are vital to remove ammonia, water and carbon dioxide can, in their very movement, cause drafts. A draft is a relative thing. A British researcher, C. G. Payne, did some work at the Royal Veterinary College in London on the relationship of temperature and draft in broiler houses. Payne's work shows that fully-grown broilers avoided positions where the airspeed exceeded 70 feet per minute when the temperature was 60°. But at 70°, airspeeds up to 150 feet a minute were unnoticed by the chickens. "We've been talking vaguely about drafts for years, not knowing what we meant by a draft," said Dr. Christie. "It's a question of comfort and that's a very difficult thing to analyze."

The temperature and the air movement in a building have a very complicated relationship. There is a range of about 20° in which a chicken is "physiologically comfortable." This is the range between 61.7° and 81°. Below 61.7° (known as the lower critical temperature) body heat production by the chicken must increase to maintain the normal temperature. The bird is not necessarily uncomfortable until the temperature is considerably below 61.7° but it must consume food to supply the extra heat. This is

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When a bird gapes, and spreads her wings, it is hot. But a cooling fan may cause a useful turbulence or a dangerous draft. And the same airspeed may be a draft in cool weather, but very pleasant when it's hot.

Ventilation and Disease

Poultry are the first livestock to be pushed to the utmost in packing animals into a small space. Thus they've been first to hit some of the probems of disease caused by poor ventilation. They suffer from gases like ammonia and carbon dioxide, together with moisture, which accumulate in a poorly ventilated house. These gases cause irritation to the respiratory tract, and stimulate chronic respiratory disease (CRD). Research is beginning to solve the problem of getting the bad gases out without putting the birds in a draft, or getting them too cold in winter. Ducted inlets are one answer, insulation is another.

Knowing Where You're Growing

Cows, buildings, land, and manpower must match for profitable expansion.

By R. A. Norman

"IF I COULD have 100 cows, I could make some money." This is a notion lodged under the caps of a growing number of ambitious dairy farmers. Quite a few are doing something about it. One mortgaged his farm and built a big pole barn to house such a herd. Then he found himself out of credit, with only 12 cows to start paying off the big new investment. Obviously it takes more than one jump between a herd of 12 and a herd of 100 cows.

But the notion that big herds operate to advantage is valid, according to a study in southern Michigan made by research men at Michigan State University. Even with their all-new buildings and equipment, dairymen with the biggest herds had the lowest investment per cow. Mechanization cut their labor costs and resulted in higher output per man. Big herds had the lowest costs per hundredweight of milk produced. With good management and equal production per cow, net income was a good cut above the best that a smaller-scale dairyman can hope for.

On the other hand, it is taking eight to ten years, and a total investment of around $100,000 to step up from a herd size in the 30- to 50-cow bracket with 180 acres of work land, to the big herd of 80 to 120 cows with 400 acres. Only determined, shrewd managers, able and unafraid to handle a big debt load, can bring off such an expansion program. To do it, the Michigan study shows it is of first importance to proceed by a succession of steps so that each new major investment starts paying off right away.

For many dairymen it is logical to ask, "Do I need to expand on any such scale? Or at all?"

There are more ways to expand than by increasing cow numbers. Culling and higher grain feeding to good cows, along with earlier cutting of hay crops, would increase milk on most dairy farms with no change in the number of cows. Modernizing crop management could produce extra feed for a few additional cows.

The Michigan study shows there are three fairly well defined plateaus of herd size for successful dairy farming under present conditions. The best one-man herds at around 30 cows are still highly competitive. And the two-man herd of 50 cows or so, with expert management, remains a tough one for the big herds to top in net income per man.

Example of a one-man herd in strong position is the operation of young Mervin Chamberlain in Clinton County, near Elsie, Michigan. Chamberlain is 31, a slim-Jim who moves with quick and springy steps, makes a point of getting his chores done on schedule regardless of interruptions. The stall barn on this farm, which he and his father, Roy, remodeled 10 years ago, has 28 stanchions and every one is occupied by a milking cow. Heifers and dry cows run outside. Their shelter is one end of an open tool shed. When they remodeled, the Chamberlains brought their barn right up to date for that time with drinking cups, sweep-in mangers and a mechanical gutter cleaner. It is still a handy barn to work in.

Up to this year, Roy and Mervin Chamberlain have operated as a partnership, sharing the work about equally. But recently the father has been slowed down by arthritis, so he has turned the operation over to Mervin to run, going into what he chooses to call retirement. Actually, the older man still handles a tractor on jobs like plowing, where he doesn't have to get off and on a lot.

Shifting from a full two-man labor force to essentially one man amounts to expansion. "I think 28 to 29 cows is just about right," is the way Mervin sizes up his newly enlarged responsibilities. His father agrees with a slight reservation: "It is, at least until he finds out what it's like to handle this many by himself."

What makes the Chamberlain farm a good example is its overall size and high output in relation to labor force, investment and expense. With 200 acres of cropland there is a surplus of crops for the cash grain market. It amounts to a substantial addition to income from the herd, while spreading the cost of field equipment. According to Dr. L. H. Brown, one of the leaders of the Michigan dairy farm study, the high-income farms in the 30-cow group averaged 180 acres of cropland. The low-income farms averaged 150 acres.

Dr. Brown has calculated that the value of crops produced on the average dairy farm accounts for 55 to 60 percent of the gross income. At the same time, crops call for only 30 to 35 percent of the labor on these farms. It is a point no dairy farmer, regardless of the size of his operation, can afford to ignore.

Production per cow last year in the Chamberlain herd, with an average of 29 milking, was 503 lbs. of butterfat, 13,600 lbs. of milk. At this level, returns above feed cost average just about $400 per cow. By way of comparison, cows producing only 10,000 lbs. of milk a year return about $270 above feed cost. Chamberlain feeds a concentrated grain ration liberally, along with high quality hay and a limited amount of corn silage. Hay is cut early in June and curing is finished on a mow dryer.

One serious handicap to an operation in this size group is the very modest degree of mechanization it can afford. Dr. Brown said, "A machinery investment of more than $60 per tillable acre begins to take a bite of income out of proportion to the time and manpower saved. For 200 tillable acres, this rule dictates that machinery investment be held below $12,000. Investment is figured at cost, less depreciation."

40 Cows With Part-time Help

A yearly output of 500,000 lbs. of milk would be respectable for a two-man operation with upwards of 50 cows—the middle plateau of efficient dairy farming. Henry Beland, Jr., of Lake Odessa in Ionia County, Michigan, has reached that level with only part-time help. His 40 cows are producing at an average rate of 13,000 pounds of milk. His operation shows what can be accomplished by expanding a herd a few cows at a time, without any major overhaul or addition to a big conventional barn, without buying more land, and without departing from the owner-operator plan of farm management.

Actually, there are only 34 stanchions at Beland's. He has to shift

The Prines, Don, Wes, and their father, Carlton, increased their herd from 30 to 100 head. A mechanized silage feeder (shown in the background) and a self-feeding hay barn help cut the workload.

a few cows in and out at milking time. Dry cows and extras make-do in an open shed at one edge of the paved barnyard. Heifers are housed on a rented farm where Beland makes use of the barn and silo. This is a 70-acre place he rents to increase his land above the 150 acres he owns. Then, last spring, he bought a new four-plow tractor and took on an additional block of rented land to make it pay. Because he can cover more ground in the same time, his hours of field work remain the same, while volume of crop production is up.

A tall, rugged man, his thin face cut across with an easy smile, Henry Beland is a master of tricks to meet his labor requirements. For 18 years he has hired a succession of high school boys in their junior and senior years to work at chores during school months, full time during vacations. The Belands provide board and room, then pay wages better than teen-age boys could earn elsewhere.

In the rush of field work, Mrs. Beland, who seems to enjoy work in the barn, takes her husband's place at milking time. They use a milk conveyor to save steps. "With this equipment to take milk to the bulk tank from any point in the barn, one man (or woman) can handle three units, and still do a topnotch job of milking," Beland said.

For the big harvest jobs, this dairyman trades work with neighbors. Haying equipment is owned jointly with a neighbor. This includes crimper, baler and elevator. Beland has his own combine, but teams up for grain harvest with another neighbor who owns a cornpicker. This arrangement trims machine investment, too. Cow feed is custom-ground. Silo filling is hired.

By such ingenuity, this genial dairy farmer has contrived to develop a high-volume business on what, by today's standards, must classify as a small farm.

After 10 Years, 100 Cows

The Prines of Springport, Michigan, in Jackson County—Carlton and his sons, Wes and Don—are rather small-framed, quiet men who seem to have agreed not to get excited or annoyed no matter what happens. And some disturbance is bound to pop up almost every day on a dairy farm with 100 cows and nearly 400 acres of cropland, all to be worked by just three men. Hornets nest in the top of a feed auger. A cow in heat slips and breaks her shoulder against the feedbunk. The plumbing springs a leak.

Calmness is probably a family trait. You can see it in the blue eyes of Carlton Prine. But it is also a well-taught discipline based on a keen understanding of human nature. "The boys always got along well together," Carlton remarked, in reviewing how they reached the decision to form a partnership with one big herd, one farm, one set of machine equipment. "They are ambitious. I wanted to be sure they had a chance to do as well here as they could have done in some other kind of work off the farm.

"Each could have farmed for himself. But then they would have to own big equipment together to be efficient, and there would be the question of who gets his crops in first. This year we were rained off from combining wheat on time. But we are all even; nobody's wheat was left standing in the field. If you are last at a time like this, it's easy to get to feeling you are always last."

The process of expanding the Prine herd to 100 cows covered a period of about 10 years. When the boys graduated from high school (Don in '49, Wes in '52), Carlton owned 320 acres with two sets of buildings. Each of the two barns had stanchion room for 20 head, and a small milkhouse suitable for handling milk in cans. They were milking two herds, each of 15 cows.

As the boys came in as full-time partners they added a few cows, so that by 1956 they were milking 40 in the two-stanchion barns. The Prines were quick to see the advantages of going to bulk cooling, but the high initial investment argued for a combined herd, and after some more figuring, for double the number of cows—up to 80 head. With that kind of volume, the 8 cents per hundred premium for bulk milk would soon pay for a tank and free the capital invested in it for other uses.

"It was the boys who pushed expansion," their father says. "I would have been satisfied to go on as we were." The plans of the younger partners prevailed and they went ahead, built a 70x70-foot pole barn east of the old basement barn on the home place, and brought the two herds together. Then for a year they milked cows in shifts, in and out of stanchions.

In 1957 they built a new milking parlor-milkhouse with six side-opening stalls, big enough to handle 100 cows in a three-hour milking stint—if later they decided to go that big.

"It turned out there wasn't any good stopping place short of 100 head, once we started into big-scale expansion," Carlton Prine said. This is a point that has been stressed repeatedly by Dr. Brown since the study of herds made in 1959. "I have found mighty few herds in Michigan that have jelled at 60 or 70 cows," he says. "Once you jump off into expansion from around 50 head, it usually takes big investments in new buildings, and the operation doesn't balance out until you get to somewhere in the range of 80 to 120 cows." The hulking scientist, with balding, close-clipped head and scolding voice, then clinches the point with figures on what it costs to get big.

"We know what Dr. Brown means by plateaus of expansion," said Wes Prine, the younger son. "By our figures, if we are to go on from here, the next jump will have to be up to 150 cows."

The year they built the milking parlor the Prines put up a 20x40-foot silo with unloader, and a long feedbunk equipped with a shuttle-type barn cleaner to distribute silage. Two years later they added 10 feet to the top of the first one and built a new 20x50-foot silo beside it. Installing a cross track at the top, they made the one unloader serve both.

With this new construction, they badly needed a bigger volume of milk to pay off the extra investment, so they bought a bunch of well-bred heifers due that fall. Also, they rented an additional 130 acres of work land. Previously they had bought another 60 acres, enlarging the home base to 380. With a total of 510 acres, nearly 400 of it tillable, they figured they could up their machinery investment to $22,500 without pushing expense per acre out of line. Only then did they buy a field chopper and self-unloading wagons, and a big diesel tractor of 63 belt horsepower. Up to that time they had hired their silo filling.

Right along with this, the Prines were expanding their output per cow and per acre. They stepped up their corn planting rate to around 22,000 kernels per acre, used more fertilizer, especially nitrogen. They found they could get corn in earlier at less expense, and get better stands, when they pulled a clodbuster behind their plows, then planted in wheel tracks. Weeds were slow to start in the loose soil between rows, so they could delay cultivating until first-cutting hay crop was out of the way. With corn in quicker they pushed their hay-cutting schedule ahead. In May this year, some of the earliest they cut was field-cured and and baled, with the bulk of the crop going into their silos as haylage.

Good cows, fed high-quality roughage and grain, have brought production for the herd this year to a shade over 500 lbs. of butterfat per cow. That's roughly 1,350,000 lbs. of milk. 450,000 lbs. per man. This summer they stepped up grain feeding. In addition to the amount their better producers can clean up in the milking parlor, each cow in the herd gets an average of about four lbs. of extra grain a day metered into the silage. Cows get all the hay crop silage they will clean up, in addition to pasture.

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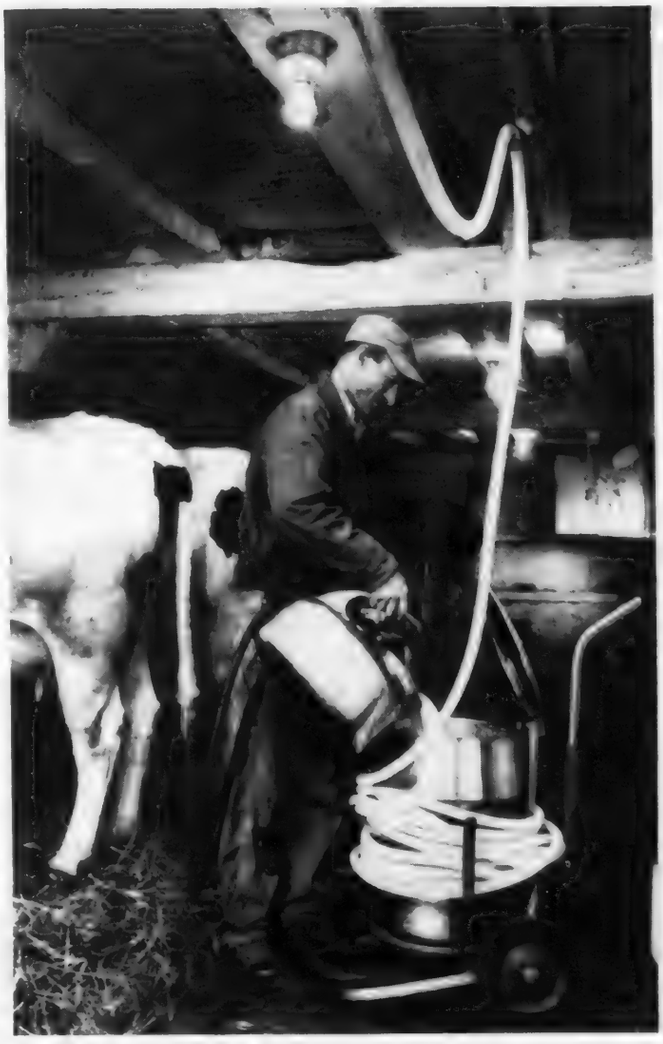


Mervin Chamberlain (top left) has increased income by cutting labor and increasing cow production through culling and through better feeding. Partial barn mechanization and sharing field equipment has enabled Henry Beland, Jr. (right) to operate a 40-cow dairy with part-time help and a low machinery investment. With the milk transfer system, his wife handles the milking during rush periods. A big bulk tank (below) was one investment which forced Carlton Prine and his sons to combine two small herds and begin building to their present 100-cow operation.

By Jean Nally as told to R. J. McGinnis

SNOWBOUND

THE PRICE OF IDAHO ranch land decreases in proportion to the distance from civilization. Near the head of Crane Creek Valley, fifty miles from Weiser, which is about as far away as one can get from a town, we found 900 acres we could afford. The price included grazing rights for 100 head of stock, some broken-down equipment, a dilapidated three-room dwelling, and a barn. A sway-backed old mare named Blaze was thrown in.

There was no telephone, no electric power, no plumbing, no doctor within fifty miles, no corner grocery. It was primitive; how primitive was brought home to us when we attempted to complete adoption of a child. The State Welfare Board turned us down because we had an outside toilet and were, therefore, not quite civilized.

I am Jean Nally; my husband is Vern. We had married the first year after the war, in 1946, and I worked in an office while he finished college under the GI Bill. He had saved his pay and made a little money selling war surplus while he was in school. With what I could add, we made the down payment on the ranch.

With the help of neighbors and a kindly banker we bought ten bred heifers and eight head of feeder steers, twenty-four hens, and two tons of coal. We cut the hay off the meadow along the creek, repaired the corral, and stuffed newspapers into the chinks between the weatherboarding. Vern cut a supply of stovewood. We bought what we thought were enough supplies to last us through the winter, and drove home four range cows loaned us by a good neighbor.

We felt we were prepared for anything that might happen until spring; we were on our way to fortune and the good life.

We didn't know that we had picked the worst winter in thirty years to start ranching. We found out that two people, plus a big German shepherd, can consume an unbelievable amount of food, and 18 cattle eat their way through a mow full of hay in no time at all. And when you are snowbound for 116 days, as we were, strange things happen to two people, even if they love each other.

I was a city girl and blissfully ignorant of what ranch life could have in store for me. My husband's family had been ranchers and some of it had rubbed off on him. He was not a greenhorn, but he had a lot to learn about surviving an Idaho winter.

The red barn in the mountains is not the author's, but the beginnings of winter are the same throughout this country. Soon this place, too, will be snowbound until the spring chinooks. Jean and Vern Nally (above) are now old hands at enduring Idaho winters. Each year they prepare for the worst with plenty of fuel, food, and fodder for their growing herd.

The first thing he learned was that the hay would not last out the winter. A quick estimate, made by counting the bales in the stack in the corral and guessing at the loose hay in the barn, revealed that each animal would be lucky to get a ton and a half. It was a rule of thumb that it takes two tons to winter through. We also had Blaze. While the cows were a godsend, and we were grateful, they would require more hay than the young animals if they were to keep up even the trickle of milk which they gave. Blaze, an aging lady with poor assimilation, was a hay burner of the first rank.

The nearest town was 50 miles away over a mud road; there was a grocery of sorts 20 miles away. Our nearest neighbor lived about a mile across the range. We could barely see an upstairs window of his house.

There was all too little time to prepare for what was to come. We were so tired when the day's work was done that we ate our supper and dropped into bed. Once, that fall, we drove the pickup thirty miles to a barn dance, and once I went with Vern to Weiser for medicine for a sick heifer, and a few other supplies we found we had overlooked. With those two exceptions I did not leave the ranch from before Thanksgiving to late March.

On a midmorning a few days before Thanksgiving the sky in the northwest took on a leaden, sullen hue. It became as calm as a vacuum and the air was oppressive with a weight you could feel pressing down upon you. About noon, with a howl like a horde of charging Tartars, the blizzard broke upon us. It blew fine, icy crystals straight before it for five days, piling up five feet on the level —house-high where it drifted.

The cattle crowded into the barn, and the old rooster found a perch on a beam above Blaze's stall and stayed there. Vern strung two lariats from the house to the barn and made morning and evening trips to break out hay. None of the stock went to the creek, 50 yards away, for water. They licked snow.

We stoked the fire, played gin, and stood at the window and looked at the blank whiteness—stood and looked and marveled.

On the morning of the sixth day the sun rose bright and clear, and the temperature dropped to 20 below. We looked out on the endless miles of whiteness. It seemed that the snow went on forever, across the rolling swells, up the slopes of the distant moun-

(*Continued on page* 153)

Draft and Drift Control

Canadian research on snow and wind control seeks to improve farm buildings and layouts.

WATCHING A white-coated man putting a one-inch plastic model in a two-foot stream of water and then squirting a mixture of aluminum powder and detergent into the water from a hypodermic needle, you'd have legitimate cause to wonder what he was doing.

You'd be excused if you didn't guess he was examining the effects of wind and snow around farm buildings. Yet this is exactly one of the techniques used by Professor F. H. Theakston, of the Department of Engineering Science, at Ontario Agricultural College, at Guelph.

Professor Theakston and John A. Underwood, a lecturer at the College, are engaged in a productive series of experiments using models to determine the behavior of wind as it flows over modern farm buildings. By following the wind over, around and inside a structure these two researchers have been able to locate drafts and pin down where snowdrifts would form to upset animals and disturb farm work. Then, by altering structures, moving buildings and placing windbreaks and snow fences, they've shown how to eliminate or reduce the drafts and drifts.

The Wayward Wind

The trouble is, wind isn't visible, so it's difficult to tell exactly where it is going in a building. Snowdrifts can be seen, and indicate wind patterns in and around a building. And the researchers emphasize drafts are just as important as drifts. They can make livestock just as uncomfortable, even though they're not visible evidence of poor building design.

The first experiments were done in a wind tunnel by using imitation snow made of light sawdust, scattered over scale model buildings. "The wind tunnel was very successful, and we're continuing to use it for pressure studies," said Theakston, "but everything happened so fast we didn't get a chance to see how it was happening. We would drop in the 'snow.' It would accumulate around the building, but we'd never know exactly how it got there."

It was then they got the idea of using water as the snow-carrying medium and using sand for snow. It's the first time this technique has been used on farm buildings, they believe, although it has been used on other structures.

The Flume

The snow tester they use is a complicated mass of pipes and channels built in the basement of an old gymnasium building, which is the engineering workshop of the College. Conveniently, an old swimming pool in the gym basement was made obsolete by a more modern pool in the new building. The old pool, boarded over, serves as a sump for the water used in the experiments. The water is pumped in a steady flow to a 12-foot-long tank about two feet

wide and two feet deep. Even flow is maintained by a series of baffles and deflectors at the head of the flume. Depth of water and speed of travel in the flume can be adjusted by other baffles.

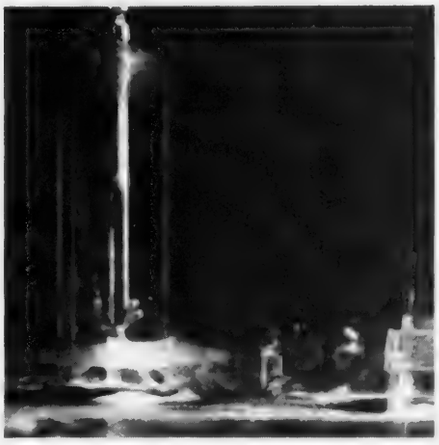
The models are made of clear plastic on an exact scale of 16 feet to the inch, and placed on a circular plastic board in the bottom of the flume. Turning this board orientates the building to any direction of snow or wind. The snow is fine, white sand scattered through wire mesh at the head of the flume. Certainly the sand is heavier than delicate snowflakes; but also water is heavier than air—in almost the same proportion. The sand-snow flows down in the water, engulfing the model in a very realistic light green snowstorm (the water is olive green from the addition of a rust inhibitor). In most realistic fashion the snow accumulates around the model buildings, builds up on the roof and swirls inside. With startling reality the drifts build up; slowly you see the bare half-circle of ground brushed clear around a silo, the crested swirl of white flakes behind a snowfence.

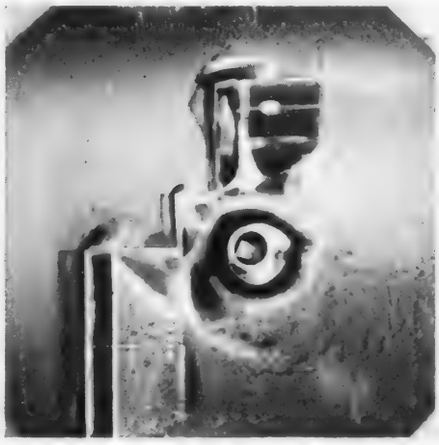
"When we started," said Theakston, "we found we were getting certain patterns in the flume. The first problem was to be sure these were the same as those that occur in the field. We tested scale models of existing farmsteads and found the snow patterns in our flume extremely similar to those in the field. When we found different patterns on our models we discovered there would be a bank of trees or shrubs affecting the wind on the actual building."

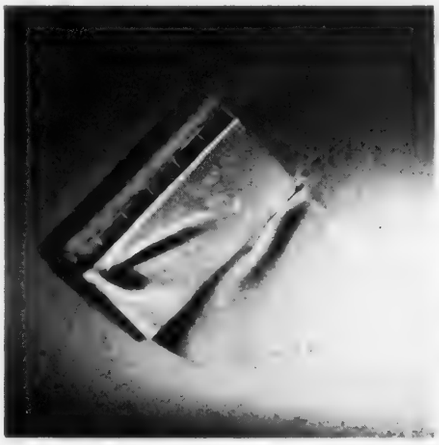
Once they had shown the models behaved like the real thing, they could start testing various structures under different wind and snow conditions. They photographed the

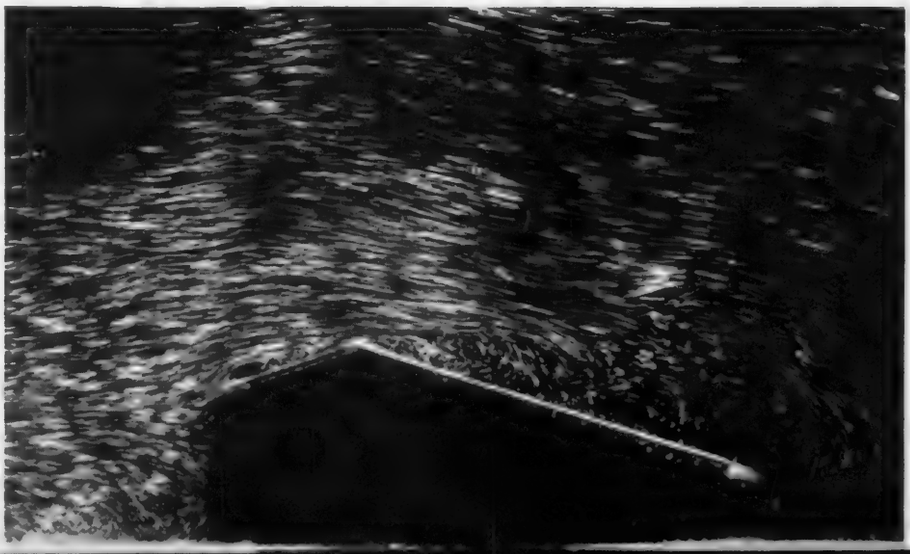
(*Continued on page* 118)

A snow fence (left) will hold most snow if the ratio of slats to space is 40:60. The lower photos are all scale models of farm structures, taken in a water flume, with white sand used to imitate snow. In every case the "wind" is from the left. A circular hood (left center, below) stopped wind from picking up feed from a lazy susan bunk and spreading it around the farmstead (extreme left). Typical patterns of snow are seen in the bottom row of photos. The two buildings (left) are too close, and snow is building up between them. Notice the drift entering the long building at the leeward end. The pole barn (center) shows the drift pattern for a corner wind. The wind curls over the roof and enters the extreme downwind corner of the shed. Then it curls around the back, appearing at the corner near the bottom of the page. A partition in the shed can control most of this. The same pole barn (bottom right) with a back wind shows how the building disturbs the wind and snow. The dots are snow moving slowly. The streaks are snow moving fast. The snow falls, to form drifts, underneath the slow-moving areas. At the right it is curling under the roof to enter the open front. The model farmstead (below) shows the different drift patterns from a small change in wind direction, and a diagonal fence instead of a right-angle fence. Less snow entered the buildings in the right-hand model.









By Charles R. Koch

HOGS ON THE WIRE

Ontario begins a teletype auction system for selling slaughter hogs.

THE ONTARIO, CANADA, hog-marketing system is getting uniquer and uniquer. A year ago we thought it was unusual enough to do a feature on it. Today the system is even more unique, if there be degrees of uniqueness. Electronics have entered the market, and slaughter hogs are now bought and sold across the province by means of an instantaneous teletype system. SSOWWBI (Simultaneous Swine Offering With Written Buyer Indentification) the system is called by the Bell Telephone Company of Canada, which developed it at the suggestion of J. R. Kohler, the genial manager of the Ontario Hog Producers Co-operative. Three years of research and experimentation went into its development before it was finally put into service the end of last April.

Briefly, this is the system: A special teletype machine, the master machine, and a specially designed piece of equipment called an electronic broadcast repeater, are located in the central office of the OHPC in Toronto. This equipment is connected with buying machines in the offices of the 17 principal packing companies throughout the province. Still another buying machine is located in the OHPC office. This handles the bids of some 30 smaller packers whose purchases (each less than one percent of the hogs marketed in the province last year) are not large enough to warrant their having machines of their own. These buying machines are like any other teletype except for the addition of a large black button at the left of the machine.

The electronic broadcast repeater is the heart of the whole system. It is about two feet wide by two feet deep, and about seven feet high. It contains 12,000 soldered connections, 85 vacuum tubes and 1200 diodes. On its face are a series of letters, each identifying a buying machine. Above each letter is a white light which flickers when the system is in operation, to show that the buying machine is in contact. Below the letter is a red light which flashes when that particular buyer is the successful bidder.

This is the system itself—a master machine, the electronic broadcast repeater, and a number of buying machines.

Here is how it works: The producer brings his hogs to one of the 45 marketing yards operated by the OHPC. By teletype or telephone, the yard advises the central office in Toronto of the arrival of the hogs and the number in the offering. The sales staff in the Toronto office gives the operator of the master machine an order to offer these hogs for sale. The operator types out the date and time, the yard where the hogs are presently located, their lot number and the number of hogs offered. For example:

NOV 2—61 2:44 KITCHENER
LOT 27 41 HOGS

This means that as of 2:44 P.M., Nov. 2, 1961, the Kitchener yards are offering lot number 27 consisting of 41 hogs.

Then the operator starts a tape on which has been punched out a declining price scale offering the hogs at an opening price decided upon by the OHPC sales staff and declining in five-cent drops. If the opening offer is $31.50, for example (this is per hundredweight for a Grade A dressed carcass, all hogs in Canada being sold on a grade and yield basis), the price sequence will come across on the buying machines as follows:

31.50 .45 .40 .35 . . . etc.

This offering appears simultaneously on all the buying machines. When a buyer sees the price appear at which he would like to bid, he presses the button and the hogs are his—if he is fast enough. Several potential buyers may hit the button at approximately the same instant. The machine, however, is capable of separating the bids by 1/1000th of a second. The buyer must wait until both the cents digits appear (.35, for example) before pressing the button. Otherwise he buys the hogs at the higher price immediately preceding.

A red light appears on the face of the broadcast repeater, indicating the buyer of the hogs. The operator types the name of that company, but this appears only on her machine and the machine of the successful bidder. None of the other buyers knows who bought the hogs. The successful bidder confirms the deal, and the sale is concluded. Then the master machine broadcasts the price to all buying machines, but with no mention of the buyer.

The price is never allowed to drop more than a dollar. If, for example, a lot is started at $29 and drops to $28, the $28 offering is repeated and the bell on all machines sounds three times, after which NO SALE is registered. The lot is then re-offered later in the day, or held over until the next day.

The total cost of this service is currently about $3000 per month. It is met by a charge against the packers of one-and-one-half cents per hog bought.

From the technician's standpoint the system is a success. Breakdowns and outages occurred during the first few weeks of operation, as was to be expected. But basically the system works. It takes less than a minute, on the average, for each transaction—about two seconds elapse between each price offering—and 40,000 to 45,000 hogs per week are handled with ease.

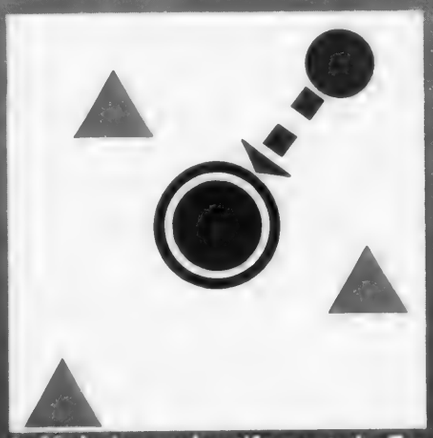
Background

Still unanswered is the more fundamental question, Is this the truly equitable way to sell livestock? Producers, packers and the OHPC all seem to feel that it is an improvement over the system it has supplanted. Last year's article, "Collective Hog Marketing in Ontario" (FARM QUARTERLY, Winter, 1960-61) detailed the complete background of the marketing situation. Briefly, it was this:

With the Toronto Stock Yards being the only government-supervised public market in the entire province, the vast majority of hogs were shipped directly to the packers. Price was supposed to be set on the basis of the competition at the Toronto yards, but

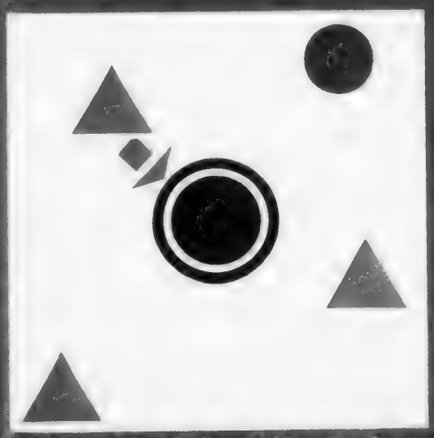
(*Continued on page* 84)

All slaughter hogs in Ontario are now sold by a teletype system of auction which uses a descending price scale. The seller makes offers to sell, beginning at a high figure and coming down. One bid from the buyer concludes the sale. The Ontario Hog Producers Co-operative is the exclusive marketing agency for the producers. Its central sales office, which is the nerve-center for the teletype system, is located in Toronto. It has 45 marketing yards scattered throughout the province as indicated on the map above. The producers ship their hogs to these yards. The map also indicates the locations of the principal packer-buyers. The workings of the system are described in the following diagrams:



1. Marketing yard notifies central office of receipt of hogs.

2. Sales office teletypes offering of lot to buyers.

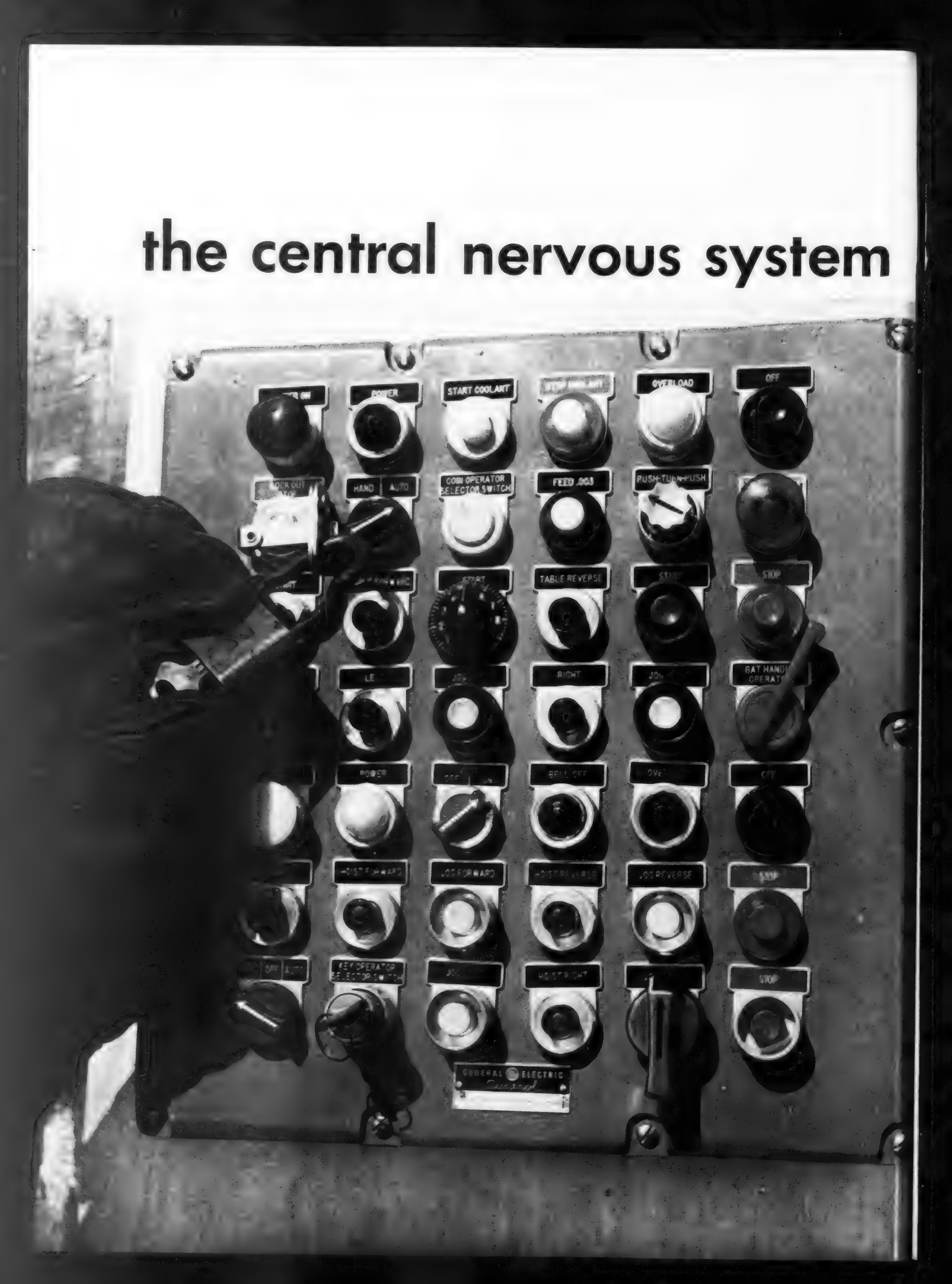


3. When offers decline to his price, buyer pushes button and registers his bid.

4. Central office notifies yard of sale.

5. Yard ships hogs to successful bidder.

the central nervous system



By M. E. Pollard

of the farm CONTROLS

YOU WOULDN'T buy a horse without a bridle. But how about a bridle (and a switch) for that electrical horsepower?

The world behind the pushbutton is a fascinating one. Almost anything can be done automatically. We've seen the driverless tractor, the automatic feeder, the timer to dim and shut off poultry house lights.

Sometimes the reaction is "It's too complex for me to understand, too expensive or unreliable for a farmer to use." This just isn't true. Although some control systems are expensive and complicated, most controls are relatively simple and perform a simple operation. Wiring them requires some skill, but if a farmer knows what controls are available, and what jobs they can do, he can ask an electrician to install the system. But the electrician alone may not know enough about farming to know how and where controls might be used.

The simplest of controls is a single manual on-off switch controlling a single motor, but many systems contain more than one motor. "For example," said Hoyle Puckett, "the routing of material in a materials handling system will usually require several of a group of motors, not always the same motors or in the same sequence. They could be operated by manually operated switches, but this rapidly becomes so complex the operator can be confused, and might start machinery in the wrong order. He may get feed flowing into a hammermill that hasn't yet started."

Puckett, rotund electrical wizard of the USDA at the University of Illinois Department of Agricultural Engineering, continued, "When the system becomes complex you need controls which operate the necessary motors or equipment in proper sequence to perform a given job. This sequencing of electrical power controls is most easily done with relays or magnetic motor starters. The use of these multiple switches makes it possible to start the system by a single pushbutton and to stop it the same way. All the functions incident to starting and stopping are programed through various components of the control system.

"A very important aspect of the interconnection of controls is the interlocking of fuses and other safety and limiting devices to prevent malfunction of equipment. When you have automatic starting it is doubly necessary to protect the equipment from indirect operation, and when it stops it must stay stopped. When a wiring system calls for 'disconnect means' it don't mean maybe. This 'disconnect means' must cut off all power to the whole system or there are bound to be accidents." Puckett paused to emphasize, "You wouldn't figure it safe to pull cockleburs out of a bull's ear just because he was asleep."

This display panel gives an idea of the tremendous variety of switches in different forms. Some can be locked on or off. Others, like number three in the second row down, need a coin to operate them. Some light when "on." And one is designed for operating with a gloved hand—with the black arrow, bottom right. They vary in cost, usually in the $5 to $10 range, each.

CONTROLS

Nearly all electrical controls are switches of one kind or another. Many are hand operated, and are found in relatively simple circuits. Relays—a group which includes the magnetic motors starters—are remotely operated switches. A relay may contain a bank of contacts, rather like five or six simple on-off switches joined together, and operated by a magnetic coil. One relay may control another, through a time delay, starting a second motor sometime after the first. Then there are the more automatic switches, which turn machinery off or on without human assistance — thermostats, humidistats, photoelectric cells, pressure switches, and the like.

As circuits and controls get complex, they are often put in a separate electrical circuit of their own, at a lower voltage and current than the powerlines which drive motors. In many cases this cuts costs.

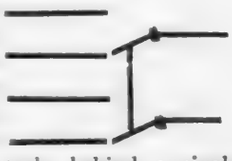
A to Z in Switches

Practically every electric control contains a switch. That switch makes or breaks an electrical circuit, starting or stopping some operation. Relays and magnetic motor starters are remote-controlled, magnetically operated banks of switches, but switches, nevertheless. Timers and thermostats may be automatic and actuated by the weather or the hour, but when they actuate it is through a switch. There are some exceptions, of course. Certain speed controls for motors operate by changing voltage. Some vibrator conveyors change volume of flow by altering the voltage to the vibrator. And there are variable resistance switches which dim lights or give the different heats on an electrical range or oven. But there are not many of these applications in farming. Most controls, then, operate a switch and it is *how* they operate a switch that gives the variations and provides the service.

There is a vast range of manually operated switches, which run from the 15 cent single pole, single-throw switch to a $180 hand-operated job which will control a 100-horsepower motor. The single pole, single-throw switch is the simplest of all:

The three-way switch can control a light, for example, from two different positions. The single pole double-throw switch can work two circuits, so that one must be off while the other is on.

Both these switches have a center off position, where neither circuit is completed. Then there are double pole, double-throw switches which will control two separate circuits. For example, they can turn on a light and start a motor at the same time, but keep the two circuits separate. They, too, have a center off position:



The wafer switch is a selector switch like the channel selector switch on a television set. These may be mounted in stacks behind a single pointer, to operate a dozen or more selections with a different circuit for each wafer.

The range of switches is enormous—you can get the pushbutton type (push on, push again, off). Some are coin operated, with a slot that must be turned with a narrow edge, like a nickel. This is to make it a little more difficult for kids or nosy strangers to work equipment. Then there's the fully locking type, some with a padlock, some with a key like an automobile starter.

There are many types of foot-operated switches—Furnas Electric Company, Batavia, Illinois, has one at $11 which is "on" only when the pedal is pressed. There are many variants, from $10 to $40, all designed to control a machine when your hands are full. For example, when packing eggs from a moving belt, a foot switch is ideal to control the flow.

Then there is the vane operated limit switch, working without being actually touched. A metal arm passes through a U-trough in the switch, and stimulates a magnetically operated switch. The two parts don't touch.

The Micro-Switch is a Minneapolis Honeywell trade name, but it's a bit like Kleenex

(*Continued on page* 161)

Busting the Auger Barrier

The number of cattle being fed efficiently by auger is going up.

By Robert Carmody

AN ECONOMIC ANALYSIS, like a rumor, has a tendency to grow and gain authority with each retelling. In 1960 Roy Van Arsdall, an economist with the USDA at the University of Illinois, made a study of different methods of feeding cattle in drylot and suggested that hand feeding was probably most economic up to 50 head. From 50 to 250 head mechanical feeding with augers was the cheapest feeding method, and in numbers larger than 250 the self-unloading wagon dumping feed into fence-line bunk feeders was the best.

Without regard for the explicitly stated assumptions Van Arsdall used for his problem, his solution quickly became a rule of thumb and with further retelling was well on the way to becoming a feedlot law, much to Van Arsdall's annoyance. At this point, a number of farmers began to break the law—and apparently got away with it.

One of these scofflaws was Roger Gallup, a graduate in agricultural economics from the University of Illinois, who compared the Van Arsdall assumptions with his own farm conditions and came up with a different conclusion. Had he still been studying economics at the University of Illinois, his professor might have been tempted to give him an "A" for the proper application of economic reasoning to a given set of facts. Since he is now a farmer, he didn't get an "A," but he did get an outstanding feedlot.

Van Arsdall's assumptions were that the farmer was free to build an efficient cattle feeding layout without regard for existing buildings, that he would be feeding steer calves on corn silage for a period of 330 days, and he figured labor costs at both $1.00 an hour and at $2.00 an hour. The job of getting feed out of storage and moving it to the cattle was analyzed in terms of methods used—by hand, with mechanical silo unloaders, with mechanical auger feeders, an ordinary wagon, and with self-unloading wagons emptying into bunk feeders.

Roger and his father, Dwight Gallup, whose 600-acre farm is some 20 miles north of Peoria, Illinois, had a different set of problems and reached somewhat different conclusions. First came a personal problem—should Roger become a farmer, or should he return to the university and make agricultural economics his lifework? Dwight Gallup left this decision strictly up to his lean, sandy-haired son, knowing that his training in economics and his levelheaded approach to life gave him the necessary background to analyze each possibility.

The decision was not an easy one. Roger loved farming, but he was also strongly tempted by the academic life. The farm, part of which had been in the family for four generations, was well run by Dwight Gallup and one hired man, Louis McIntire. The farm has 22 miles of terraces, which make about 480 acres of the land suitable for continuous corn. The other 120 acres is rolling land best suited for alfalfa. The farm also had a large pond near enough and deep enough to provide plenty of water to a hilltop site where excellent drainage made an ideal location for a feedlot.

Roger decided to stay on the farm. He then had to figure a way to increase the gross income. A feedlot would do this.

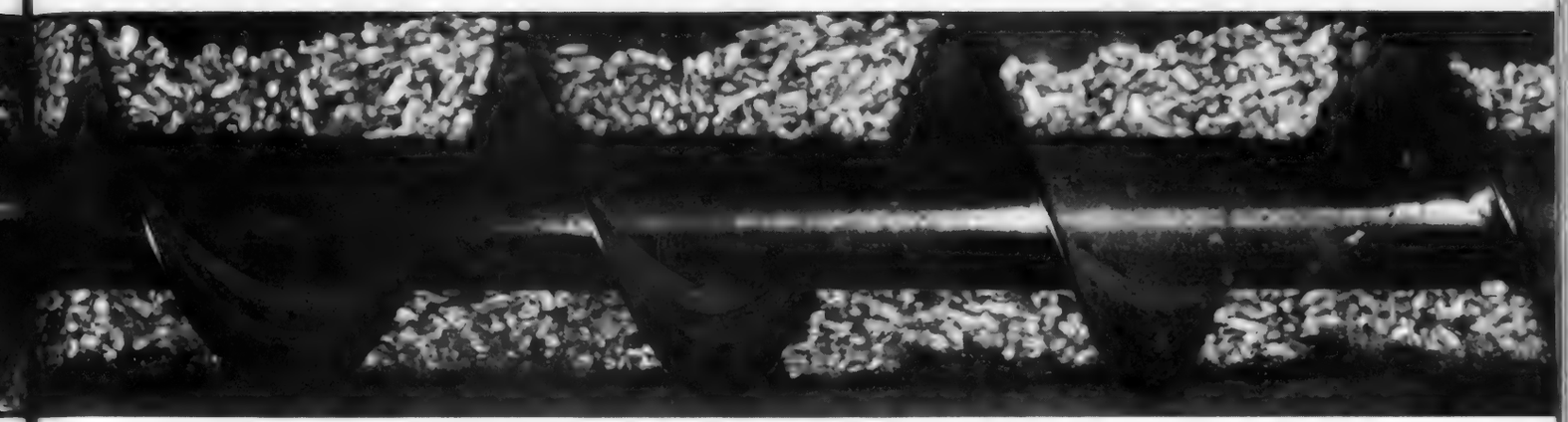
Such a lot, Roger felt, should make full use of the 120 acres of alfalfa by feeding this material as haylage and thus bringing a gross return of around $100 an acre for this land. The corn could be fed either as soft corn or mature grain. As Roger put it to his father, "A feedlot of this kind will make better use of the alfalfa crop, provide manure for the cornland, increase the gross income, and make full use of everyone's time." Dwight Gallup grinned and said, "I never did need any of these things to make full use of my time, Roger, but it's your decision."

The Feedlot

Specific plans for the feedlot began to take shape when Dwight and Roger Gallup went to the Materials Handling Show at Peoria in June, 1960. This show, sponsored by the Central Illinois Light Co. and the University of Illinois, is designed to give manufacturers of materials handling equipment a chance to show their wares. "We don't bother to go to fairs anymore," Dwight Gallup said, "but this is a show where all the exhibitors and everyone who attends is interested in automation, machinery and farming." Here they had a chance to see and compare the available equipment. After a careful study they decided to work with their nearest neighbor, John Hensel, who is a member of the Harper and Sauder firm—distributors for Harvestore.

The result of their planning and consultation is a feedlot, built around auger feed handling, which is large enough to feed from 400 to 600 head of cattle. The lot is built around three 20 x 50-foot Harvestores, each capable of holding 225 tons of haylage. The Harvestores were erected on the north end of the lot, along with a supplement bin. On the south side of this line of giant blue tanks is a 20 x 60-foot drive-through feedroom, and south of this a pole-type cattle shelter, 160 feet long, 44 feet wide, which, on its west end, becomes L-shaped with another pole barn shelter 32 x 110 feet. The main shelter is open to the south, the west wing is open to the east. Prevailing winds are from the west.

The concrete slab, 180 x 160 feet, is divided down the center by



a fence, and each half is further divided by the roofed-over feeding auger and a short fence. The augers are 140 feet long and are fitted with a baffle board beneath them to direct feed into either side of the bunk. Each feeding auger is connected to the feedroom by another auger, these two conveying augers forming a V. This arrangement divides the feedlot into four equal pens, each of which can be fed a different ration if desired.

The rich-smelling, damp haylage is delivered at a relatively constant speed into a 10-inch U-shaped trough with auger set into the north floor of the feedroom. As the haylage moves along, minerals, salt and supplement are metered into it in accurate amounts by a vibrator. Next, cracked corn is added. The feed is elevated by use of an inclined auger and carried to either of the two feeding augers by the distributing auger.

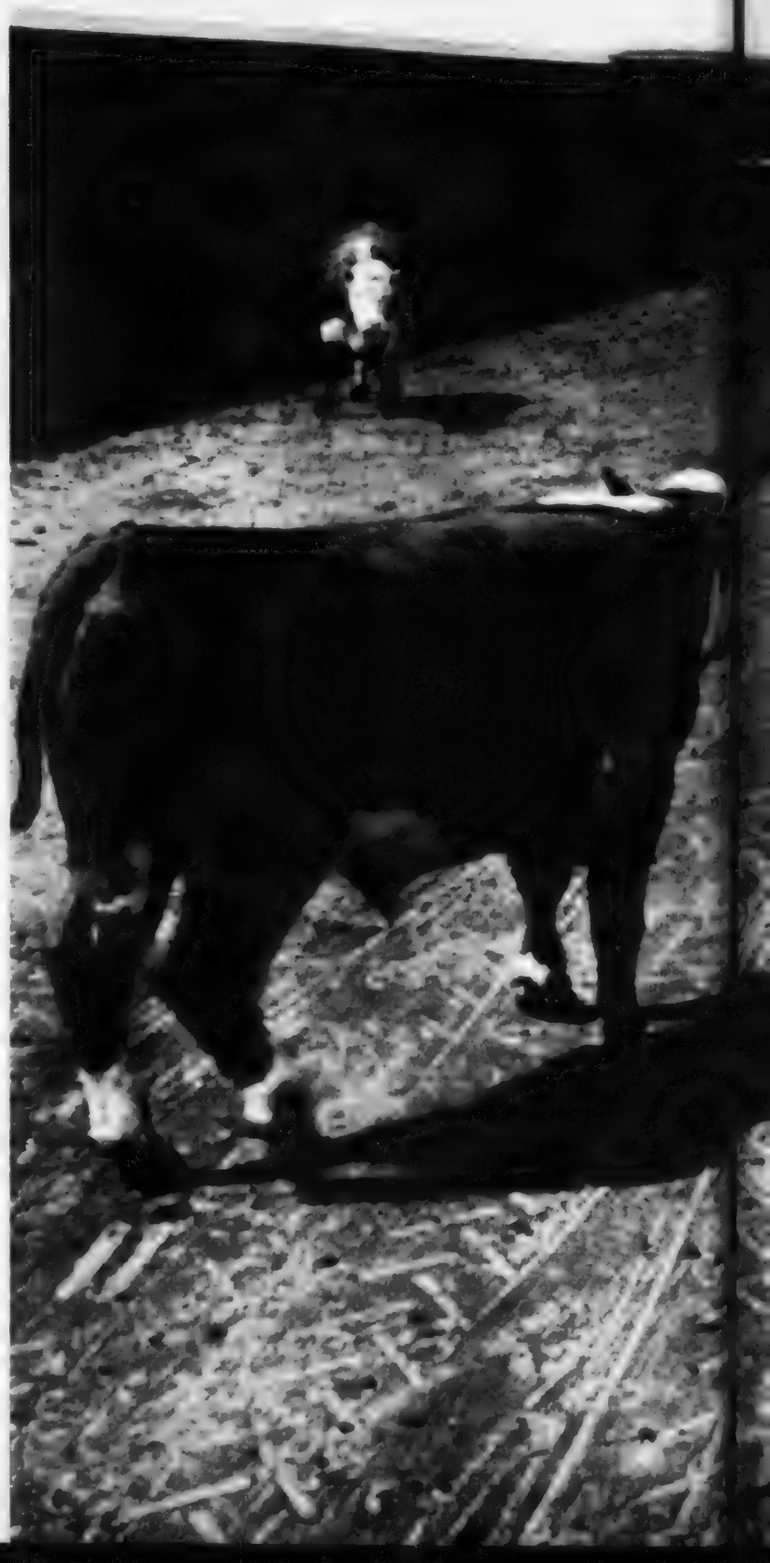
The corn is measured into the feed through a clever device called a Wa-Ro-Matic. This is an assembly of a measuring bucket which dumps a bushel at a time into a hopper from which it flows through cracking rollers and on into the haylage and supplement in the floor auger. A counter on the device can be set to drop any amount of corn into the feed and then automatically shut off.

Since the haylage is unloaded into the auger at a constant rate, both the supplement and the corn must be added at different speeds in order to change the ration from pen to pen, or to increase the grain in the ration as the feeding period progresses.

Roger begins an actual feeding by checking the feedbunk to see how the cattle have cleaned up. If the bunks are licked clean, he may increase slightly the amount of feed given. If some of the roughage is left he knows that he should cut down a little. He makes these adjustments by either speeding up or slowing down the rate at which supplements and corn are added to the haylage.

He regulates these measuring devices and sets the number of bushels of corn he wishes to feed, on the counter of the Wa-Ro-Matic. He then goes to the control panel—a General Electric Industrial panel arranged to fit farm needs—and starts the feeding operation. Pressing one button starts the distributing auger to the east feeding tube (a 10-inch Roto-tube auger) which a second switch puts in operation. He then starts the incline auger, which raises the feed up to the distributor, followed by the floor auger and then by the Harvestore unloader, which begins dumping feed into this floor auger. Two more buttons activate the supplement feeder and the Wa-Ro-Matic. Putting all this equipment into operation takes about 5 seconds. When the right number of bushels of corn have been dumped into the system, the counter of the Wa-Ro-Matic shuts the system down. Roger then goes to the

There are some things they would change in their feedlot if they had to do it over, but Roger and Dwight Gallup are happy with auger-moved feed. To Roger, the lot meant the difference between farming or not. He loves farming and the feedlot makes a two-man farm support three.



John Hensel with Dwight and Roger Gallup, designed this auger-operated feedlot for the Gallup farm. The first year, 560 head—half calves and half yearlings—were fed out. The two augers and fences divide the yard into four lots. By flipping a baffle board beneath the auger each lot can be fed a different ration. The slab is cleaned by scraping with a tractor, as the tire marks show.

lot and flips the baffle underneath the feeding auger so that feed will be dumped into the other side of the bunk.

When the other half of the east bunk has been fed, he moves the second distributing auger into position and begins feeding on the west auger. On this auger, incidentally, he has installed a motor-driven baffle board with which he can direct feed from one side of the bunk to the other by a switch, rather than manually. If this works out he will install a similar baffle board under the east auger.

During the operation he may walk through the lot checking on the condition of the cattle, but he must stay at the feedlot during the entire feeding operation. As he put it, "This is certainly not automation as some people call it. It is mechanization, and needs attending to all the time it's running."

The first cattle to go through the feedlot consisted of 300 head of steer and heifer calves and 260 head of mixed yearlings. Starting with 600 to 700-pound animals, they would limit the lot to 400 head. With the 560 head it took 40 minutes per feeding. During the winter they fed three times a day; twice a day during summer.

With four pens, each of which could be fed a different ration, the Gallups have considerable flexibility with this lot. They can feed light or heavy animals, or they can feed around 300 head of light animals in two of the pens for a full year's feeding and put around 100 head of heavier animals in each of the other two lots for feeding out in 120 days. This would both spread their risks and increase turnover.

Second Thoughts

No system is perfect, and the Gallups have had some second thoughts about this one. "In planning any feedlot I would start by considering the problem of manure disposal," Roger said. "Our neighbor and designer, John Hensel, devised a very good system. We simply push the manure down the length of the lot with a scraper mounted on the front end of the tractor, and it goes under the fence and into a concrete alley or gutter wide enough so that a tractor-scraper can push it the width of the lot and onto a manure spreader. This works fine during most of the year, and takes two of us about two hours to clean off the slab and spread the manure.

(*Continued on page* 108)

by John MacCallum

LOW COST GRAIN HANDLING

Two Indiana farmers vary the details on the same basic grain-handling facility.

As ONE IDEA is tested, it generates another. When Bruce McKenzie, agricultural engineer at Purdue University, Indiana, finished the layout for the grain-handling setup of Theoren Chapman a year ago (FQ Autumn 1960), his mind was a-buzzing with new design ideas—modifications of his basic plan.

The result was that when he learned his colleague, Noah Hadley, economist at Purdue, wanted a new grain storage and handling building on his farm, McKenzie drafted plans for an even more radical, low-cost facility to dry, store, grind, mix and deliver grain. In this case the corn was to be fed to hogs, but the setup could easily be adapted to work equally well for beef or dairy.

The new layout is particularly interesting to the farmer who wants to build a step at a time, because of either limited time or limited capital. A good facility can be built to dry, handle and store 15,000 bushels of grain all for about 60 cents a bushel. Furthermore, the facility lends itself to a slow changeover from existing setups; it is easy to use other storage for supplements; a portable grinder, pto mill, or automatic mill fits in well; and either self-unloading wagon or auger delivery of the finished feed is possible. Any drying method can be used.

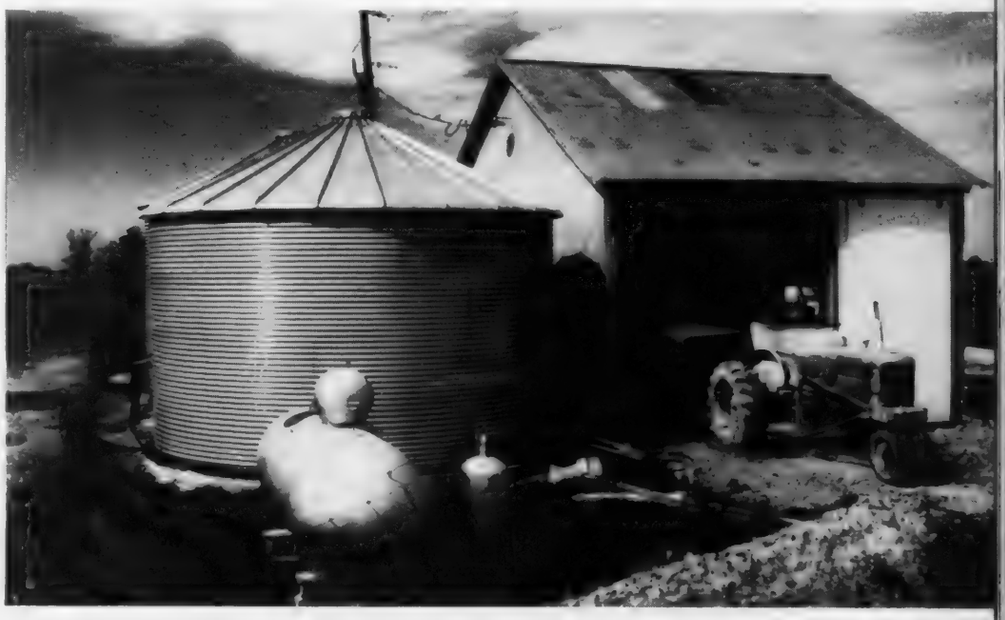
The basic layout is a drive-through rectangular pole structure (we'll call it a barn), flanked by grain storage bins. One bin (at least) has a false floor for drying, with a relatively low temperature heater and fan attached to the drying plenum. Batch drying is used, about 1,000 bushels per batch. A four-foot depth of grain can be dried—so the diameter of the bin determines the amount. The heaters vary from 300,000 to half a million b.t.u., running as long as 20 hours per batch.

A central elevator housed in the pole barn fills the bins and the supplement hoppers which are built into the barn. The hoppers empty by gravity or auger into the grinder, mixer or wagon. The grain bins are unloaded by gravity, through an auger which runs under the bin. When the grain has emptied to such a point it no longer flows to the center hole, the rest is drawn out by a small sweep unloader which rotates like a watch hand, drawing grain to the center of the bin and thence, via the recessed auger, to the outside.

Drying keys well to the harvesting operation. As soon as the drying floor is covered with grain, the heater is fired up and the fan is started. Filling continues to 800 or 1,000 bushels. Drying can be controlled by timeclock so the heater shuts down when the grain is dry; the fan then cools the grain for a couple of hours. Heater running hours may vary from 6 to 20 a day, depending on the size of the heater and the moisture content of the grain. Each morning the dry grain is moved out of the drying bin to a storage bin.

The last chore of a harvest day is to fill a few wagons with 200 or 300 bushels of corn, and hold them overnight. Then, the minute the drying floor is empty, the wagon-held grain is moved to the drying bin, and the heater starts again. Thus the small heater is used to the maximum and drying does not wait on harvest conditions.

All grain enters the same way. It is dumped in the middle of the concrete floor of the pole barn. Unloading is fast, and grain removal from the floor can be automatic. An auger moves the dumped grain



Wilbur Siebrase (left) moves a suspended auger under the discharge spout of a batch feed mixer. Just behind him is the burr mill. To the right is the vertical auger and the sweep auger that picks up grain dumped from a truck, pulls it to the grating at the bottom of the vertical leg. The automatic switch to stop the sweep is on the pole to the extreme right. The drive-through building as yet has only two bins flanking it (right). Two more will be added, giving a total bin capacity of about 10,000 bushels.

to the bottom of a vertical elevator, which lifts the grain high enough to drop in the bins by gravity, or to reach a cross auger that fills the bins.

Slowly Does It

McKenzie stood in the center of the grain building he designed on the farm of Wilbur Siebrase, Noah Hadley's tenant, waiting for Siebrase to come back from feeding some of the 1,200 hogs he finishes every year. "The first step," said McKenzie, "is to get the farmer away from the idea that he has to do things fast. If we can show him that smaller equipment used for a longer time saves money, we've overcome the first hurdle. The next step is to substitute management for money. It's easy to solve problems by buying more equipment. I want to do it without plowing in the bucks. With careful management you can do exactly the same job with small machinery that you accomplish with a big dryer, a big elevator and a big cost."

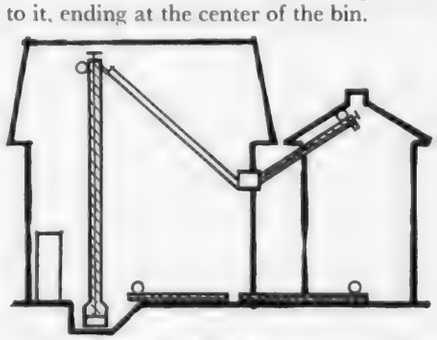
Along this line of cost-cutting McKenzie planned the Siebrase grain setup. Siebrase, back from the feeding job, explained he grows 165 acres of corn on the 248-acre farm and feeds it all. "We didn't start here to build grain storage; we started out to build a feeding operation to feed the pigs. Now I've got one that does the job, and gives me drying and storage in the bargain."

McKenzie explained, "We wanted to get the most efficiency out of a tractor-grinding system. This system can work for a man using as little as 7,000 to 8,000 bushels of storage, and yet we can take the same layout and, using slightly different equipment, push it to 50,000 bushels. The central structure remains essentially the same, so does the mechanization. Really, all you have to do to get bigger, is to increase the number and size of the bins."

Cutting Costs on Equipment

What are the elements which makes the lower initial cost in the smaller operation? Well, the Siebrase setup uses a force-fed vertical auger instead of a bucket elevator which was used on Theoren Chapman's pioneer installation. The bucket elevator is still mandatory for a larger setup, but Siebrase's vertical auger is doing a good job. The reduction in initial cost is considerable. Chapman's elevator cost $770, including the 1-hp motor, whereas Siebrase's vertical force-fed auger is under $270, including the 1-hp motor. Another advantage of the auger is the "built-in" swivel. (It is made by the American Planter Co., Burr Oak Michigan). The casing is split and it is easy to rotate the head of the auger from the ground. This eliminates the expensive swivel head necessary on a bucket elevator, and also the extra height of the building necessary to house the swivel head.

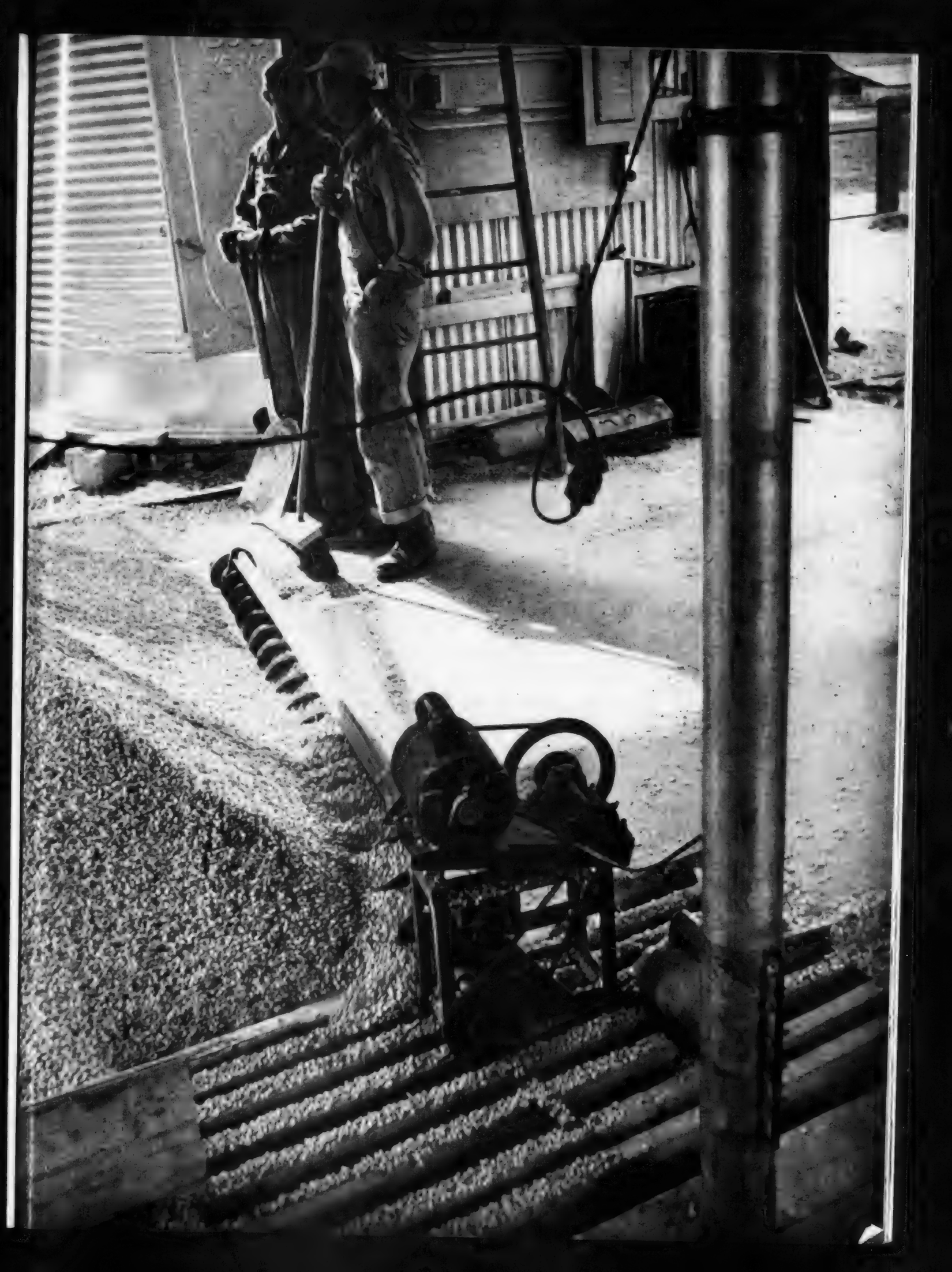
Unused height in a building is expensive, and the Siebrase setup uses a novel combination of gravity and augers to fill the two bins across the driveway, yet keep the roof low. Grain goes up the elevator. From there a gravity pipe leads down at a 45-degree angle to a small hopper on the opposite wall of the pole barn. From this hopper two augers angle up again, one auger to each of the two 2,200-bushel bins. These 4-inch augers run upwards through the pole barn wall, and through the bin wall. They run under the bin roof, and parallel to it, ending at the center of the bin.



The scheme has three advantages. First, it cuts down suspension problems on the augers as they are all under a roof and can

(*Continued on page* 134)

Monte Sink (left) manhandles his vertical auger into position over the hopper of either of his bins, swinging it on the pulley attached to a single pole. In contrast, the Siebrase setup (right) uses a fixed vertical auger, and a combination of gravity and other augers to reach the bins. The brush and shovel clear up the small amount of corn the sweep auger misses.



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HOGS ON THE WIRE

(*Continued from page* 70)

with so few hogs moving through those yards it was questionable how large a role this market played in establishing prices. Most hogs left the farm with the producer completely unaware of prices and market conditions, and they were hauled to a buyer who frequently quoted no price until after receiving them. There was little or no bargaining between producer and packer.

But there was plenty of bargaining between packer and trucker. The producer paid the trucking costs, but the truckers demanded —and got—"transportation adjustments" from the packers. This neat little blackmail amounted to $1 to $3 per hog, which the packers paid the truckers in order to get the number of hogs they needed to keep their plant in operation. There was competition, but the truckers rather than the producers were the beneficiaries.

For almost 25 years, Canadian law has permitted the collective marketing of farm products. Under the provisions of this law the Ontario Hog Producers Marketing Board was set up in 1945, and after years of negotiations, the producers organized the Ontario Hog Producers Co-operative in 1955. This co-op became by law the exclusive selling agency for all Ontario slaughter hogs. Marketing yards were set up at strategic locations throughout the province, and all hogs were brought to these yards before being offered for sale. The yards would notify the central office in Toronto on the arrival of the offerings—just as is done now—and the central office sold the hogs to the packers through private treaty by telephone. This was the situation until April of this year.

The packers, particularly the larger ones, were never pleased with the old system. Theoretically, the hogs were sold to the highest bidder. But once a price was established there was very little variation between individual sales, and the charge was made that the hogs were allocated, with disproportionately large numbers going to packers favored by the OHPC.

Some farmers were as restive as the packers. They opposed the compulsory features of the system, and looked with suspicion on the telephone method of selling. It was suggested that the hogs be sold at auction, and as far back as three years ago, the present plan was conceived. Charles McInnis, who was president of the OHPC until last spring, was unalterably opposed to selling at auction, feeling that in such a system the producer lost all control over the sale of his product, and that the buyers were few enough that they could get together and rig the market.

A three-way battle developed between the packers, the OHPC, and the provincial government which is charged with the supervision of the various commodity marketing schemes in the province. To add to the confusion, these three found themselves the target of sniping from disgruntled farmers and truckers. Politics, too, played its part in the fracas. Finally the provincial government ordered the OHPC to change its method of selling and the present method was adopted.

The immediate reaction was a denunciation of "sell-out" from partisans of the compulsory hog marketing scheme who contended that the switch in selling method reduced the co-op to a "watered-down, emasculated, bloodless organization."

McInnis declined to run for re-election this spring after the provincial government had also forced the organization to adopt a change in the rules for electing directors. He had said he would never consent to OHPC adopting a sales system which smacked of the auction method and he was true to his word. He describes the present system as "discrimination against the farmer. I'm for auctions," he says, "when the government makes the fertilizer people, the machinery manufacturers and all others who supply the farmers with their production needs sell by auction, and not until then. The present system, in my opinion, should not be described as a selling method. It is only a buying method."

Whatever happens in the future, the new system has seemed to favor the producers during its first few months of operation. The supply of hogs has been relatively short, particularly during the summer, and the packers have competed vigorously against each other to get them. Daily price fluctuations of $1.50 a hundred have been common while extreme fluctuations of even $2.50 to $3 have been registered occasionally. (*Continued on page* 86)

"I save about $100 a year on paint costs alone," says Ivan George of his tilt-up buildings at Edgar, Nebraska. This 40'x80' cattle shelter has 9'-high tilt-up concrete walls and a split-ring truss roof. The post-free interior and rugged concrete walls permit easy cleaning with the tractor.

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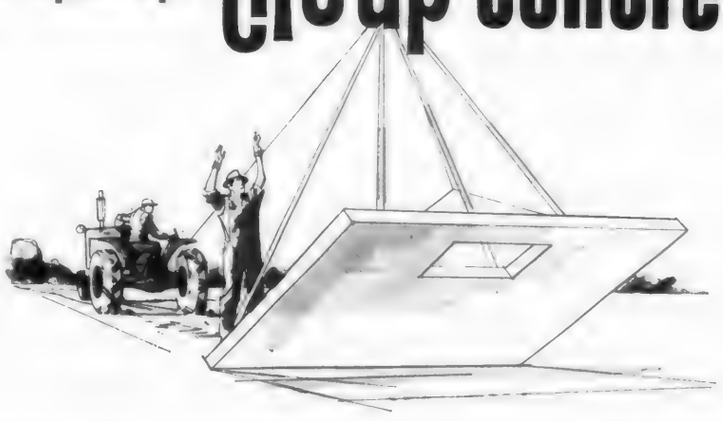

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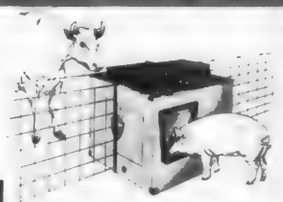
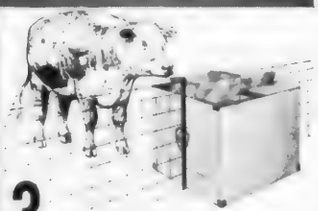
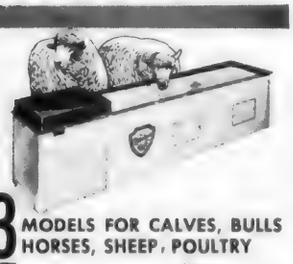


4 COMBINATION WATERERS FOR HOGS AND CATTLE



3 CATTLE WATERERS

6 HOG WATERERS



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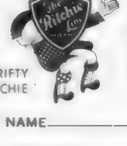

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A seven man Producer-Processor Liaison Committee has been meeting at regular intervals to iron out the bugs in the system. A few weeks after the system was inaugurated, one of the packers on the committee let go with a blast at the prices he was being forced to pay. "If I could find out who the —— —— is who's buying all these hogs," he said, "I'd tell him a thing or two!"

This, says Jake Kohler, is the very reason for hiding the identity of the buyers. There is the fear that A would retaliate against B if he ever found that B was buying too many of the hogs he wanted.

The producers seem, in general, to like the new system. Allen Cook, one of the bigger producers in the Toronto area, calls it "a big improvement over the old system," though he is still annoyed by the compulsory features of the plan. He points to the wide fluctuations in price as a serious fault and one which can cause considerable friction. There is the instance of the father who sold hogs one day at $28.10 and his son who delivered a similar load to the marketing yard a few hours later and got $30. This is calculated to produce squawks in any fraternity.

The provincial government is breathing much easier now that the thorny question of auction vs. telephone selling has been resolved. "We insisted upon three points," say Everett Biggs, assistant deputy minister of the Ontario Department of Agriculture. "One—all packers must have an opportunity to buy; two—the hogs must be sold to the highest bidder; and three—adequate records must be kept. These points have been fulfilled under the teletype system." A copy of every sale is available for scrutiny by the Ontario Farm Products Marketing Board, if requested.

The packers' attitude is mixed. H. K. Leckie, managing director of the Meat Packers Council of Canada, says that, in general, the members of that organization feel that the new teletype system represents a decided improvement and overcomes the principal objections which major processors had with respect to the previous method of offering and sale. "While short term price variations between individual lots has presented some problems," he says, "this is to be expected with a new method, particularly one which allows every buyer to bid freely at all times on all lots in every location. Individual packers have also had difficulty in keeping average costs of their kills in line with current hog cut-outs and processed product realization, particularly during the summer period of seasonally lower supplies. Now that a mutually acceptable method of sale has been adopted, the Council feels that producers and processors can work together on quality improvement and other general problems affecting the future of the whole hog industry."

Gordon Presswood, of Presswood Bros. Ltd., a Toronto packing house, prefers the old system. "This teletype scheme has cost the packers thousands of dollars," he says. "Under the old system, prices were more stable. This new system might be all right if you knew who you were bidding against and how many hogs were going to be offered. You see a few small lots of hogs offered on the machine and you begin to think there are not many hogs around today so you fight to get those small loads.

"If you were sitting in an auction barn you'd know who was buying and you could gauge your bids accordingly. But here you don't know whether it's a little fellow, or a big boy or what's going on."

Harry Poworoznyk, president of Essex Packing, Hamilton, Ontario, heartily endorses the new system. Poworoznyk (pronounced Prosnik), a stocky little Ukranian and a grizzled veteran of the meatpacking business, says, "The teletype machine is a lifesaver to the industry. It gives you a chance at the hogs and no damn foolishness—no payoff to the truckers, no sweet talking the Hog Producers. Every Ontario packer has 40,000 hogs a week he can buy if he is crazy enough. There is nothing in the livestock business like this. It is like sitting on a securities market."

The anonymity of the buyers causes Poworoznyk no concern. "Knowing who buys is a worry to you," he says. "You worry too much about his business and not about your own. If a big man finds you are buying too many hogs he'll come after you. Maybe you buy seven to eight percent of the hogs offered and suddenly you start to buy 12 percent. The big fellow say 'Kill that guy, he's growing too fast.' With this new system the big fellow might control the market but he can't control you."

The staff of the Ontario Hog Producers Co-operative like the

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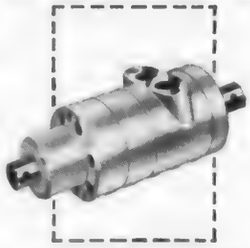

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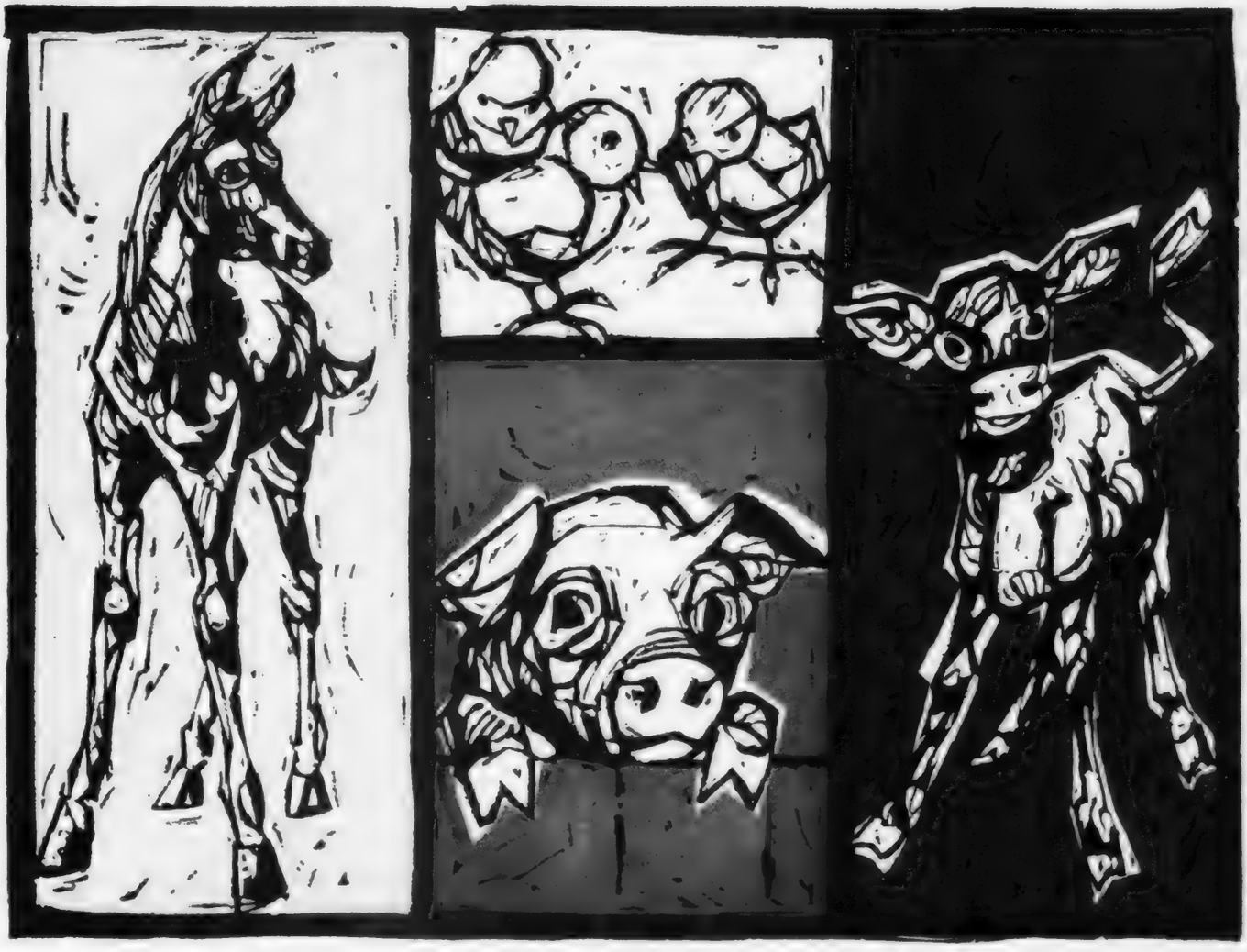
teletype system just fine. It has lifted a big hunk of responsibility from their shoulders. "The packers used to pester us all the time asking 'Why don't I get hogs?' " says Robert Kohler, son of J. R., and chief of the OHPC sales staff. "Now the answer is obvious. The whole responsibility for getting the hogs is on the buyers and they can't accuse us of playing favorites."

Lance Dickieson, Ontario farmer and new president of OHPC, says he does not look upon the new system as a straight auction method. "It's a blend of the two systems," he says, "of the auction system and the old telephone selling system. It has been well accepted by the great majority of our members and things are much quieter in the country now. There's no doubt about it, this is a much more open method of selling. We had to allocate hogs under the old system because the price didn't move. But now with buyers on 18 machines someone is always going to break loose."

And how does the individual buyer—the fellow who sits at the machine all day—like it? "It's crazier than a pinball machine," says Sam Schlosser, buyer for the Essex Packing Company at Hamilton, "but it sure beats the old system. You don't have to beg anybody to sell you hogs."

Schlosser has a list of trucking rates fixed to the front of his teletype machine. This shows him how much per head and per hundredweight it costs to ship the hogs from any of the marketing yards to his plant and how long the trip takes. The latter information is important because a packer is subject to penalties if the hogs are not slaughtered within 24 hours after purchase. Thus Schlosser's list shows him that it costs 25 cents a head, 17 cents a hundred and takes a half hour to ship hogs from his closest marketing yard, Ancaster. From Kitchener, somewhat farther away, and where he has competition from three local packers, it costs 45 cents a head, 30 cents a hundred and takes an hour and a half. At the extreme end of the scale are such points as Bellville, Hoards Station and Newburgh, with a charge of $1.25 per head, 83 cents a hundred, and a haul of 5 hours or more. Schlosser takes these factors into consideration in figuring his price differentials. For example, if he is willing to pay $30.25 at Ancaster he cannot afford to pay more than $29.95 at Kitchener. But he will not let the Kitchener packers have the hogs if they drop to this price or less at that yard.

It will probably take at least a full year, possibly even one complete hog cycle to fully test the teletype marketing system. It may be that with an abundance of hogs on the supply side the machines will exaggerate the downward swing of prices as much as they seem to boost it under a relatively tight supply. It may be that the larger packers with more capital will be able to make their smaller competitors pay through the nose and eventually force them out of business. So far, though, the system seems to have gotten off to a good start.



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one of the great men of agriculture, Theodore de Saussure, 1767-1845

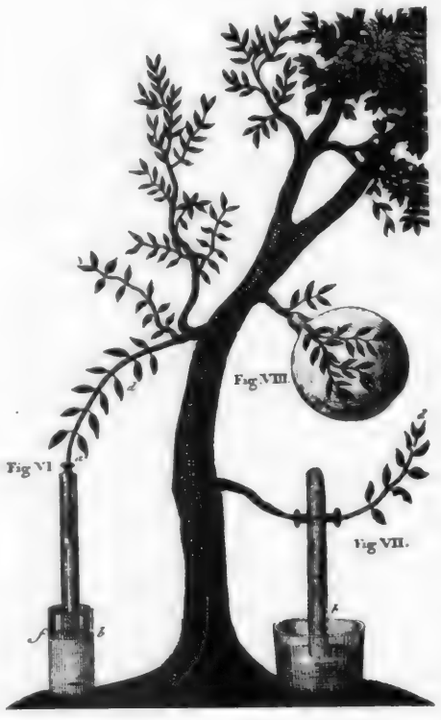
By Grant Cannon

IN THE LAST years of the hectic, revolutionary 18th century, Nicolas Theodore de Saussure, a modest Swiss scholar, began to study the problem of plant nutrition. During the next few years governments changed, and Napoleon's armies swept across Europe and, as military alliances were formed to stop his conquest, de Saussure continued his patient, exact experiments which led him to one of the first basic answers to the question, "What do plants eat?" The discoveries he made in his quiet home laboratory were as revolutionary as the overthrow of the decadent regime of France, and had as far-reaching consequences to science as the Napoleonic code had upon civil law.

The question of plant nutrition was one of the fundamental problems that had excited philosophers from the early beginnings of civilization, and continues to demand more refined answers to the present time for, as Jethro Tull said back in 1731, "The chief art of the husbandman is to feed the plants to the best advantage; but, how shall he do that, unless he knows what is their food?"

Earth, fire, water and air had all been suggested as the basic nutrients in ancient times. Each of these primal elements of the ancients had been proposed during the Renaissance as the "proper pabulum" of plants by more modern philosophers, who had discovered a radical new approach, experimentation, by which they could test their ideas and open new areas of study and new problems to be solved.

Jan Baptista van Helmont (1577-1644) had found his answer by planting a five-pound willow branch in an earthen vessel in which he placed 200 pounds of oven-dried soil. He carefully covered his vessel with a perforated lead shield to keep out any foreign matter, and then watered the plant for five years. At the end of this time he dug up the tree and found that it weighed 164 pounds—wood, bark and roots (he did not save the leaves from year to year). The soil in the container after drying was found to have lost but two ounces in weight. He therefore concluded that plant growth was due to water alone.



The breath of a tree was captured and tested by de Saussure to reveal the food plants use. His portrait (right) hangs in the Bibliotheque Publique et Universitaire, Geneva, Switzerland.

An English scholar, John Woodward (1665-1728), vigorously denied that for nourishment of vegetables "the water is almost all-in-all; and that the earth doth but keep the plant upright and save it from overheat and overcold." In a series of ingenious experiments in 1692, Woodward proved to his own satisfaction that "earth and not water is the matter which constitutes vegetables."

Woodward grew a number of mint sprigs in distilled water, others in water from Hyde Park, and the rest in Hyde Park water shaken with one-and-one-half ounces of garden earth. After 56 days of growth, the mint grown in distilled water had gained 41 grains. The mint grown in Hyde Park water had gained 139 grains, and that grown in muddy Hyde Park water had gained 284 grains. From his experiments he concluded that water was simply a carrying fluid for the nourishing earth.

Jethro Tull agreed wholeheartedly with Woodward, and based his system of agriculture on pulverizing the earth to such a fine powder that plants would be able to take the particles into their root systems, which he likened to their mouths.

Fire as a plant food also had its supporters, the greatest of whom was Joseph Priestley (1733-1804), the discoverer of oxygen. In 1778, this brilliant, radical scientist found that he could collect oxygen, which he called dephlogisticated air, from growing mint plants. He also found that plants growing in this newly discovered gas did very poorly and concluded rather cautiously "that dephlogisticated air does not supply pabulum that plants derive even from common air." To Priestley and the philosophers of his time the phlogiston which had been removed by the plant from the air was the essence of fire.

Air as the basic food for plants was proposed by Jan Ingen-Hausz (1730-99), who suggested that "the surest way to find out the real nourishment of organized bodies seems to be to inquire what is the substance without which they inevitably perish and which alone is sufficient to continue their life." Based on the assumption that there was only one such substance, Ingen-Hausz concluded air alone was the true food.

Still another school of thought confused the thinking on this problem by suggesting that plants contained a mystic "vital force" which enabled them to transmute one substance into another, and therefore it did not matter what they took in through their roots or through their leaves, since they were perfectly capable of transforming it into that which they needed.

When de Saussure tackled this problem he had three great advantages over those who had preceded him. First, he had read the work and gone over the experiments of these earlier agricultural researchers; he used their findings to further his own search and scrupulously acknowledged his debt to them. Second, he studied the writings and accepted the rigid discipline of the founder of modern chemistry, Antoine Lavoisier; and, finally, he had been born into a family

(*Continued on page* 122)

Mail-In Electronic Records

By Chester Charles

WITH AUTOMATION all over the farm, economists considered it high time machines were assigned to the inescapable chore of farm accounts. So Michigan extension economists took the lead in electronic farm accounting. Other states have already begun to copy the plan.

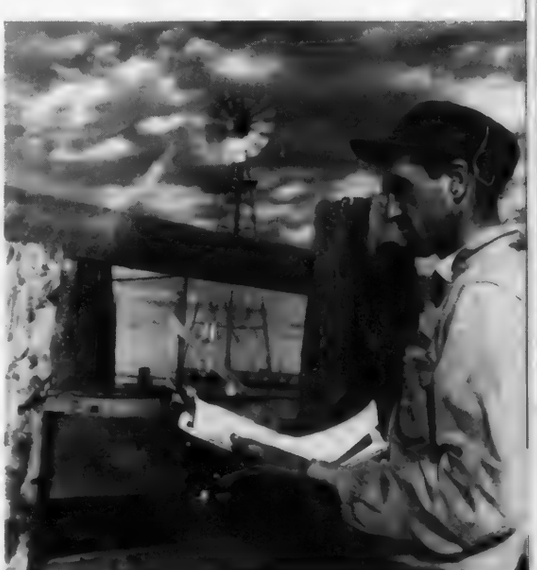
This new-style bookkeeping is almost effortless. Cooperating farmer members still keep their own records, but the arithmetic is gone. Simple listings of current transactions are about the farmer's only responsibility. Income is noted on one sheet as receipts come in. Expenses are jotted down on another sheet. An addressed envelope is provided for mailing these two simple reports each month to Michigan State University's mail-in farm record project. Once a year an inventory report is made out by each farmer in the project. That's all the farmer need do. At the university, data processing equipment does the accounting. These electronic machines classify reports by items, sort, tabulate and record them in meaningful form. No fees are charged. But the amount of free information about his own business that comes back to a farmer is surprising. He learns more details of his operation than an accountant could normally supply him. In addition, the system provides the farmer with a yardstick to compare his own business with other farms in his region.

A New Venture

The mail-in program was originated six years ago by Dr. Warren Vincent of the Michigan State University extension service. He tried it for two years on a pilot basis in two Michigan counties. Since then, under John Donneth, a national authority on farm management, the project has been refined and broadened in scope. Current membership totals 1,200 farms, with 40,000 record cards being processed each month. Although the project is of considerable service to the farmers who are selected to participate, its purpose is primarily to provide information on farm business trends and for research purposes. Participating farmers are selected whose records are needed to provide a representative sample of various types of farms in Michigan. Another important byproduct of the Michigan project has been to develop a system of mail-in accounting which can be provided to farmers on a fee basis.

The University of Missouri extension service will soon complete its first year with a mail-in project patterned after that of Michigan, except that a $25 annual fee is charged. West Virginia workers are setting up a trial project. A block of New England states, working as a unit, have laid the groundwork for such a program. Some commercial farm management organizations have entered the field and farm co-ops may soon develop such a service.

Paul H. Bebermeyer, in charge of the Missouri service, stated, "If we are to help a farmer with the complicated job of management, we must have sound facts about his business. Farm records are notoriously unromantic, and farmers are too busy to keep detailed accounts. The mail-in project gives us the facts we need, with the least effort from a farmer. In return, we can keep his records, summarize them in an annual report form, aid him in tax preparation and suggest the direction to higher income. The annual business analysis supplied each farmer gives him a better control-tool than he has ever had before."



All the farmer has to do is jot down some simple figures (right) about his farm operation and mail them each month to the farm record project. After that electronic machines take over, analyzing the data and printing quarterly and year-end reports.

How It Operates

Under the Michigan plan, a farmer is supplied a looseleaf ring binder at cost (a dollar or two). It contains instructions, carbon paper inserts, monthly income and expense sheets and year-end report blanks for livestock, crops and financial statements. Expenses and income are listed by the farmer by dates. Items are not separated or classified under different headings or on different pages. No additions need be made. A numerical listing of current livestock completes the monthly report, which is mailed to the extension service in an envelope provided. Carbon copies are retained by the farmer. The extension service returns an itemized typed report each quarter, with a final report and analysis at the end of the year. Here is where automation has moved in.

The machines used in processing the reports have a language of their own. All information to or from a machine, or from one machine to another, must be reduced to coded figures or characters.

Michigan records are processed on machines similar to those used at Missouri and other computer centers. Basically, three

(*Continued on page* 129)

Mail-In Electronic Records

Each month the farmer mails to the University dated details of his expenses and income, and a list of livestock on the farm for the month. The farmer retains a carbon copy. This information is transferred to punched cards and fed to electronic machines—computers, tabulators and sorters. The machines produce quarterly reports and an annual report, all mailed to the farmer. These provide many types of information not available even from an accountant.

The records are clearly typed and are a permanent record. Tax planning and reporting is simplified; credit negotiation is easier; and partners, tenants or sharecroppers know each other's contributions. The annual report provides a business analysis, and major changes and long term investments can be properly planned. The first state to employ this system was Michigan, with a free service. Missouri followed suit, but has a $25 charge. Virginia is setting up a trial project, and a block of New England states is hoping to begin the program.

Manure Pays Off

in the sack and on the range.

By Joe Muir

THE DISPOSAL of manure is a problem whenever large numbers of livestock are concentrated in one spot. Winter doubles this headache. Many farms dispose of manure through lagoons, septic tanks, digesters, as a liquid through the irrigation system, and by selling it to other farmers.

The McDougal ranch and feedlot at Collinsville, California, doesn't consider the manure a problem, but rather an asset. For the past 33 years Harvey McDougal has been building up the carrying capacity of over 1,000 acres of his range, pasture and hay land, by applying an average of 20 tons per acre every five years.

He has also sold some 8,000 to 10,000 tons annually to truckers.

The latest McDougal innovation is the composting, processing, bagging and marketing of "nature's best soil builder" through retail outlets.

Mac, as everyone calls him, is a heavy-set, pleasant-faced man with a quick eye and a quiet voice that has the assurance of years of profitable experiences. He has long been recognized as one of the top cattle feeders of the West.

McDougal was a cattle buyer for Swift & Company for several years with assignments at St. Paul, Denver, Ogden and Los Angeles. He became a partner with Dick Boyle in the late twenties in operating the large Fontana Farms. He came to Collinsville, then part of the Fontana Farms' far-flung operations, to manage the feedlot, and began one of the most progressive sagas of beef production through feedlot and pasture improvement in the modern West.

In 1951 McDougal bought the feedlot and organized the McDougal Livestock Company. He now feeds an average of 40,000 head of cattle annually with a feedlot capacity of 20,000 head.

"We were never satisfied with the truck sales of manure even though it made us a profit," Mac said. "Trucks coming in every day during the dry season disrupted things around the place, broke down fences, and in general interfered with our routine."

A few years ago Mac began checking into other possibilities of realizing a greater return for this feedlot manure. "My son Dick pointed out the demand for bagged manure and sold us on the idea of setting up a mill and retailing this feedlot byproduct to our city cousins for their lawns and gardens," Mac said. "So we organized Collinsville Fertilizer Inc. in 1957, built and equipped a bagging plant and lined up some sales outlets."

This firm was set up as a family affair. Five foremen in the McDougal Livestock Company, plus Mac and son Dick purchased the stock and became shareholders. Richard McDougal was named president and general manager.

Richard had just graduated from the University of California at Davis with a degree in agricultural economics and was eager to test his wings. "And his old man hasn't been sorry," remarked a foreman. "Dick is a top hand around this place."

From Yard to Bag

"Under the old program we sold the feedlot manure by the truckload, usually dealing with one or two contractors," Dick McDougal said. "We sold it for the same price for 20 years, $2.50 per ton. The truckers loaded it themselves and furnished their own loading equipment. We scraped it into piles.

"Since we started our own fertilizer company, we've figured out some new angles to improve the management of the feedlots and reduce the cost of several pieces of equipment owned by the Livestock Com-

A mountain of composted steer manure (left) is the raw material for a profitable feedlot enterprise. The compost is pulverized and bagged (right) at the rate of 400 bags an hour. Each bag holds two cubic feet of manure, weighs around 60 pounds, tests about 3-3-1½.

pany, by putting it to greater use," Dick pointed out. "Now we buy the manure from the Livestock Company for $3 per ton delivered and stockpiled at the fertilizer plant next to the feedlots. Last year we bought 8,500 tons and this year we are going to handle 9,000 tons. The feedlot crew begins this work during the last of August, and will complete the delivery by the first week in October.

"We are also busy from June to November cleaning the corrals and spreading manure out on our range and pasturelands. We start the spreading operations about the first of June and haul manure out until the fall rains stop us."

The first job of the manure cycle starts with scraping off the fresh manure accumulated during the year into piles for loading. They use a ten-foot scraper with a hydraulic adjustable blade mounted on four rubber-tired wheels, which was built at Mendotta and has been in use for 25 years at the feedlot. It is pulled by a Caterpillar D-6 tractor. One man is kept busy most of the dry season months scraping and piling.

"We are lucky in our feedlot location," Dick said. "It is situated on an adobe clay soil with no rocks or sand. We can skim off the fresh manure like scraping cement."

Then, using a huge $28,000, four-wheel drive Allis-Chalmers Tracto-Loader with a 2½ cubic yard bucket scoop, the manure is loaded either into manure spreaders and taken out on the range and pasturelands, or into dump trucks and hauled to the fertilizer plant yard. Here they build a huge compost pile about 100 yards long, 100 feet wide and sloped to a height of 30 feet.

"We build a new compost pile each year," Dick said. "The purpose of the pile is to compost the manure. It is necessary to build a big pile in a short time so the temperature will build up and destroy the weed seeds in the manure. The temperature of a pile will reach 145° F. or over, and every year we have had to sound the alarm and put out four or five fires that start by spontaneous combustion."

The plant consists of a 100 x 100 warehouse with an L-shaped wing holding the pulverizing and bagging machinery.

The plant operation begins by bringing the composted manure from the pile and dumping it into, and heaped over a pit four feet deep and 10 feet long. A chain drag installed at the bottom of the pit agitates the manure and drops it onto a conveyor belt. This belt carries the manure up a 10-foot incline to a Williams pulverizing hammermill run off a 50-horsepower motor. It goes from there over a one-half inch vibrating screen. Any coarse pieces are shaken off and and taken out a side spout

and run through the hammermill again.

From the screen, the manure travels into a measuring device which can be regulated from the bagging station. The bag contains a printed statement which guarantees two cubic feet of composted weed-free manure. There is no weight guarantee but bags average 60 to 62 pounds.

"We don't guarantee any fertilizer percentages either, but this composted manure runs around 3 nitrogen, 3 phosphorus, and 1½ percent potash," Dick said. "It is called a 3-3-1½ in the fertilizer trade."

The measuring bin sits above the bagging attachment. After filling, the bag is conveyed by belt to a sewing machine.

"We can bag 400 bags per hour with a four-man crew," Dick said. "One man on the bagger puts on a bag, fills it and slides it toward the sewing machine. One man closes and sews the end, and tips the bag onto the conveyor belt to take it to the warehouse. The bag goes up an incline, over a crest, and slides down onto a waist-high table where one man off-bears the bags and stacks them on pallets. Regal Supply Company, one of the contractors, wants 30 sacks per pallet. The pallets are made so 24 pallets fill the enclosed trucks. Redi-Gro wants 40 sacks per pallet to be loaded on flatbed trucks."

One man does two jobs. He fills the outside pit and humps the composted manure into a pile over the pit. Then he comes in the warehouse and either runs the forklift and stacks the loaded pallets in neat rows in the warehouse, or changes off with the man doing the off-bearing so each gets a turn at operating the loader and forklift.

"During the busy season in January through March, when we are loading two or three trucks per day, we use one extra man to help load the trucks," Dick said. "The forklift is then kept busy every minute of the day loading trucks and taking away the full pallets from the conveyor." These trucks will take from 700 to 800 bags per load; the pallets go with the truck.

"The bags we are using have a polyethylene plastic liner inside three layers of heavy paper," he continued. "This plastic liner protects the manure from outside moisture. It also holds the manure in an airtight container so there's no dust or odor.

"Bags are made for us by the Bemis Bag Company of Newark, California. Each of the distributors and our company have their own printed bags which each furnishes. They cost 14 to 15 cents apiece depending on the colors and amount of printing on the bag," Dick said.

The Collinsville Fertilizer Company now contracts with two distributors at a price of 26 cents per bag loaded on the trucks. "Last year we filled 200,000 bags for the

The manure plant gives Harvey McDougal (top) better use of his feedlot equipment and a double profit. The mounds of manure (below) keep the cattle out of the mud. They are not for sale—even to McDougal's company.

Redi-Gro Products Company of San Jose. They put up two brand names, *Valley Gold* and *Redi-Gro* steer manure from pen-fed steers. They distribute through nurseries, hardware stores, grocery chains, feedstores, and gas stations throughout the San Francisco bay area, central California and north into Oregon," Dick said.

The Regal Supply Company also contracts with the Collinsville Fertilizer firm for 75,000 bags under the trade name of *Jiffy-Gro* Steer Manure, packed for, and distributed by the Regal Supply Company. All of this supply is sold through the Regal Gasoline stations scattered throughout central and northern California.

"We sell some 2,000 bags of our own brand, *Champion*. Our sales are f.o.b. plant for 60 cents per bag to local residents within a 30-mile radius," Dick said. "We have also sold some 1,000 tons in bulk out of our plant at $6.50 per ton. One of these bulk sales was to the Stead Air Force Base at Reno, Nevada—350 tons to use in planting fairways and greens at their golf course. And the Healdsburg, California, high school took 100 tons for a base for their lawns and football field."

The Regal and Redi-Gro supply companies retail their brand names at various prices, usually varying from 70 cents to $1 per bag, depending on the area, demand and competition.

"Our stiffest competition is from the Los Angeles area. Most of that manure comes from dairies and includes bedding. Our composted manure runs 10 to 13 pounds heavier per 2 cubic feet than the dairy lot composted manure.

"We feel good about one thing, we have had hundreds of referral sales," Dick said. "Also we have been approached by several other distributors wanting us to start bagging for them. To date, we have stayed with our two distributors besides our own plant sales.

"We have made a few mistakes," Dick admitted. "When we first started we had a lot of dust from the type of bagger we had installed. We learned we had to add water to cut down dust and to maintain a 19 to 20 percent moisture content in the bagged manure. More than that causes some heat to develop in the bag. Wetting has several advantages. We learned that this amount of moisture keeps the manure fluffy. Customers don't want to open a bag and get a puff of dust in their faces or have the manure dusty while handling."

To solve this dust and moisture problem they installed two adjustable spray nozzles directly over the conveyor belt where the manure comes out of the pit. Then they replaced the first bagger with a Modernair bagger which contains the measuring device for regulating the cubic feet per bag.

"We watch the quality of the manure," Dick said. "If it gets too old it becomes too heavy, and not good enough for the best soil conditioner. We haul it out and scatter it on our pastures. We clean up our piles each year this way.

"One problem we ran into, which anyone installing a fertilizer plant should avoid, is that of corrosion of metal parts in the machinery and bins," Mac said. "Our next major improvement will be to replace all our bins, pipes and elevator cups with a corrosive-resistant plastic. The salts in manure we find are hard on metal parts."

Financing

The McDougal Livestock Company, in starting the fertilizer venture, advanced $50,000 to build and equip the plant. They then set up a ten-year amortization plan.

"We pay our men $1.55 per hour, including housing for the married men and bunkhouses for single men. In addition, we pay for health and hospitalization insurance and a $5,000 life policy. It costs us right at

(*Continued on page* 115)

Equipment used to scrape the lots (top) is also rented by the fertilizer company to move compost. The McDougal ranch also takes manure from the feedlot. The giant semi-spreader (bottom) carries ten tons per load. Manure has doubled the carrying capacity of the range.

MARKETING ORDERS

WHAT IS THIS THING called a marketing order? California farmers have lived with them for a quarter of a century; but, with the exception of dairymen and growers of certain fruits and vegetables, producers over the rest of the country find them something of a mystery. The wide publicity they received in connection with the Congressional debate on the newly-passed Agricultural Act of 1961 has stirred up a lot of interest in them.

Briefly, a marketing order might be described as a set of detailed regulations designed to correct or control unsatisfactory marketing procedures. These may include regulations for surplus control, quality improvement, advertising and trade promotion, research, and elimination of unfair practices. An order makes it possible for a group of producers of a particular commodity to adjust volume of supply to fit the market and to stabilize prices through such orderly marketing. This control can be implemented by the application of certain quality and grades standards. Enforcement can be obtained by fines, or in some cases court orders can be applied against those who refuse to comply with the order as it pertains to the limitation of marketing of a particular crop. The milk orders do not carry this type of enforcement; rather they use seasonal pricing to influence production.

The orders applicable to milk function quite differently from the orders applicable to fruits and vegetables. Milk orders establish a system of minimum class prices for milk used in different milk products. They do not control or restrict marketing. Fruits and vegetable orders, on the other hand, regulate the quantity or grade of the product marketed, but they do not set minimum prices. The Act of 1961 extends the orders of the fruit and vegetable type to several additional commodities.

The basic law authorizing marketing orders nationally, is the Agricultural Marketing Agreement Act of 1937. (California also passed the California Marketing Act in 1937.) This act permits the Secretary of Agriculture "to enter into marketing agreements with processors, producers, associations of producers, and others engaged in the handling of any agricultural commodity or product. . . . " and it exempts such agreements from antitrust prosecution.

The stated purpose of the act is to establish and maintain orderly marketing, to protect the interest of the consumer, to establish and maintain minimum standards of grading and maturity, and to provide an orderly flow of the supply of the commodities which come under the agreements.

The commodities which may be the subject of the agreements must be set forth specifically; and this is where the Agricultural Act of 1961 comes into play. The new act, under Title I, which is referred to as the "Agricultural Enabling Amendments Act of 1961," adds certain commodities which may be the subject of agreements and orders and excludes others. With certain exceptions and qualifications the commodities included in the 1937 act are: milk, fruits (including filberts, almonds, pecans, and walnuts, and apples produced only in the states of Washington, Oregon and Idaho), tobacco, vegetables, soybeans, hops, honeybees and naval stores.

Additions

The new act adds cherries and cranberries for canning or freezing; apples, both fresh and for canning or freezing in New York, New Jersey, Maryland, Michigan, California, Indiana, Maine, Massachusetts, Rhode Island, Connecticut, New Hampshire and Vermont; turkeys; turkey hatching eggs; tobacco and peanuts in the Southeast, Southwest and Virginia-Carolina producing areas.

It specifically excludes the following commodities from marketing order authority: chicken eggs for hatching, soybeans, honey, cotton, rice, wheat, corn, grain sorghum, oats, barley, rye, sugarcane, sugar beets, wool, mohair, all livestock, cottonseed, flaxseed, poultry (other than turkeys), eggs (other than turkey hatching eggs) and all fruits and vegetables for canning and freezing except those already covered.

Does this mean that these newly added commodities immediately went under marketing orders with the passage of the act? Not at all. The sections of the law governing marketing agreements and orders constitute merely an enabling statute. The Secretary of Agriculture is authorized to enter into agreements and issue orders, but the action to bring them into effect must be started by the producers. If, for example, the cherry growers do not get together and request a marketing order, there will be none. Tobacco has been eligible for marketing orders since the passage of the original act, yet the only tobacco orders ever issued were in 1952, 1953 and 1954, and were applicable only to Georgia and Florida shade-grown tobacco.

As of September 1, there were in effect 80 Federal milk orders and 45 Federal orders effecting fruits, vegetables and nuts. Besides these, there were numerous state orders, the great majority of them being in California under the California State Law.

So far we have used the words agreement and order rather indiscriminately in speaking of these controls. The distinction between them is that the agreements are voluntary, the orders are mandatory. Both are a contract between producers and handlers of a commodity and the Secretary of Agriculture (the Federal secretary in the case of a Federal agreement or order, the secretary or director of agriculture of the particular state if it is a state agreement or order) to control marketing. Agreements are rare. Probably 99 percent of these control measures are in the form of orders.

The process of initiating and issuing an order is usually a rather lengthy affair. To see how one is effectuated let's take the case of a milk order.

When a group of milk producers in a relatively restricted area, say three or four adjoining counties, decide they need the kind of help in their marketing problems which can be given only through a marketing order, they appeal to the Secretary of Agriculture (actually to the Milk Marketing Orders Division of the Agricultural Stabilization and Conservation Service). In the vast majority of cases this action is initiated through the cooperatives. This request is made by a committee of the producers. If discussion with the department seems to show that some kind of an agreement or order will help remedy the marketing problems, notice is given well in advance of a hearing. All interested parties are notified, particularly all producers and handlers in the area to be affected by the order. (Most authorities who have worked with orders feel they work best when confined to local areas with similar production and marketing conditions and problems).

The government usually sends out a hearing officer to conduct the hearing, an attorney who acts as legal counsel for the government, and an economist. Throughout the hearing and during any later voting on whether to accept the order, the government's position is strictly neutral. The government presents its statements first at the hearing, establishing its authority in the matter and stating the object of the hearing. Then those who favor the order testify. These may be any persons at all who are interested in having an order written. Anyone who testifies can be cross-examined by any other interested party.

After the proponents of the order have presented their case the opposition is given an opportunity to be heard and the hearing

By Charles Straub

is concluded. This entire proceeding may take anywhere from a day to a week or more. At the end of the hearing the record is read and certified by the hearing officer. The record then goes to the department for review by economists and others, particularly by those government officials who have had a part in the hearing.

After the record is read in the department a decision is made as to whether or not an order seems justified. A copy of this decision is sent to all interested parties who then have an opportunity to file exceptions. After the exceptions are reviewed by the department, a final decision is made. If the final decision is in favor of a marketing order, the matter is voted upon by the producers. If two-thirds of the producers vote in favor of the order it goes into effect as of a specified date.

These milk marketing orders set minimum prices and provide for an accounting of the disposition of the milk, that is, a statement as to how much milk is sold in each of the various classes. Any changes or amendments to the order are brought about in the same way as the original order. Like all Federal orders, the administrative and other expenses connected with milk orders are borne by the industry.

Orders can be terminated or suspended by the Secretary of Agriculture "whenever he finds that any order . . . or any provision thereof, obstructs or does not tend to effectuate the declared policy of" the act. They can also be terminated when the majority of the producers favor such a termination.

Similar to the Federal orders are the state orders. The California cling peach order is a good example. This is one of the oldest and most successful orders in the country, having gone into effect August 1, 1936.

The procedure for putting this and other California orders into effect is much like the example of the Federal milk orders, but the California law calls for a yes vote by 65 percent of the number of the producers who control 51 percent of the volume of the product, or by 51 percent of the producers who control 65 percent of the volume.

The cling peach order is a good example of the surplus control measures which are an important part of many marketing orders. All orders in California are administered by an Advisory Board. The Cling Peach Board has the power to require growers to avoid a surplus either by the removal of immature peaches from trees, by the removal of bearing cling peach trees or by dumping No. 1 cling peaches at the cannery. To further control and stabilize prices, the board enforces certain quality regulations setting forth standards for minimum grade and size. It sponsors programs of advertising and sales promotion, promotes research in the interest of better production and marketing methods and carries on a campaign against unfair trade practices.

Self-supporting

All California marketing orders are self-supporting. Each order provides for the collection of an administrative assessment or an advertising and trade promotion assessment, or both, to defray the cost of carrying out the provisions of the order. The maximum rate which the Advisory Board may recommend for any season is stated in the order. A typical rate would be about 2½ percent of the gross dollar volume for administration, about 4 percent for advertising and promotion.

The advertising and promotion programs are on a strictly professional basis. If their particular marketing order calls for this kind of activity, one of the first actions of the Advisory Board is to contact various advertising agencies for a presentation of the agencies' ideas for promoting the specific product. Eventually, one of these agencies is hired to do the job.

The following statement gives an idea of the size and financial scope of the entire California marketing control program for a typical recent year:

Number of programs	35
Number of producers affected	75,489
Number of handlers affected	3,500
Farm value of products affected	$902,487,000
Assessments collected	$9,551,380
Breakdown of expenditures—	
Administrative costs (including inspection, certification and research)	$2,884,965
Promotion	$4,959,210
Pool payments and returns	$1,384,290
Unspent	$ 322,915
Total	$9,551,380

No general tax was spent in connection with the program. Nor did the matter of enforcement present any difficult problems. As W. J. Kuhrt, chief deputy director, California Department of Agriculture, has pointed out, "This is not a case of the farm people fighting the Department of Agriculture. These marketing regulations are formulated by the industry people themselves, and they have asked the Director of Agriculture to impose these regulations upon them. In the process of developing the order and obtaining Departmental approval, a considerable amount of educational work is carried on, so that the producers and handlers themselves are quite well aware of the need for and the purpose of these regulations . . . It would be fair to say that the problem of enforcement of marketing orders and programs has not been a difficult one, and the number of instances of violation have been relatively small; practically all of the cases against violators have been concluded in the lower courts of the state."

Kuhrt has also summed up the objective of the California system as follows: "We want regulations which will enable the reasonably efficient producer to stay in business and feed his family. We do not want to subsidize the inefficient producer or perpetuate inefficiency.

"The law forbids shorting the market to push up the price. And we know that if this were done the producers would find themselves in more trouble than ever. Say it costs $50 a ton to produce cling peaches and we authorized a supply-demand balance under which the producers would get $75. The next season growers wouldn't prune their trees properly and they would leave all the fruit on them they could hold. The result would be a tremendous surplus and a critical break in price. The real danger with marketing orders lies in trying to reach stability at a price level that will not result in increased production and surpluses."

In summary it can be said: (1) that all present legislation authorizing marketing orders, be they Federal or state orders, is essentially enabling legislation. The initiative for getting the orders into operation must come from the producers themselves; (2) most of the successfully operating marketing orders in effect apply to a relatively restricted geographical area where there are no wide variations in production and marketing conditions. The original 1937 Act, as a matter of fact, states "Except in the case of milk and its products, orders . . . shall be limited in their application to the smallest regional production areas or regional marketing areas, or both, as the case may be, which the Secretary finds practicable, consistently with carrying out such declared policy."

With these thoughts we present the marketing order concept to the cherry, cranberry, apple, turkey (and turkey hatching eggs), tobacco and peanut growers. It is up to them to decide what they will do with it.

JUDGING A SKINNED STEER

Anyone can see what is under Herkimer's hide while he is still on the hoof.

WHEN THEY LEAD Herkimer out in front of the meats lab at Texas Tech, eyes pop, brakes screech and necks crane to dangerous angles as passers-by register an amazed double-take.

Herkimer is an Anxiety 4th Hereford steer. He is completely uninhibited. Not only does he go around without his hide but he makes a blatant display of his muscling as well. He is a real cool character, too. In fact, if his body temperature ever got above 32 degrees he would collapse into a sloppy, unmanageable mess of meat. For early last May, Herkimer was slaughtered, skinned and eviscerated. Then Dr. Fred Harbaugh, in charge of the department of veterinary science, removed the fat from one side and laid bare much of the muscling. After that Herkimer was lifted to a standing position, frozen and fastened to a wheeled board. His head was fitted with a halter and, with a lead shank attached, he can be pulled out of his subzero stall in the cooler and rolled anywhere on campus like a huge toy animal.

But Herkimer is no toy. He has a real purpose. That purpose is to show exactly what is under the hide of a meat animal and how the muscling and fat are laid on in relation to each other when he is standing on his feet. He provides the potential cattle judge with that look under the hide for which he has always yearned, and he raises some tough questions about some of the old accepted show standards.

Herkimer was no show steer to start with. He would probably have graded low Good and weighed about 750 pounds before slaughter. (We were about to say "on the hoof," but poor old Herk is still on the hoof.) His chilled weight is about 450 pounds. But his lack of "finish" simply helps him demonstrate that finish is largely the laying on of more and more fat without any real increase in the amount of red meat produced by actual growth.

Take the flank as a starter: Herkimer was not a fat steer but the removal of the fat from his flank left a big, gaping hole. This being the case, the deep, smooth flank so admired in the show ring turns out to be nothing but an added deposit of fat. There seems to be no relation between the depth and fullness of the flank and the size of the round. The only connection a full flank would seem to have with a desirable carcass would be if it somehow led to the development of more stifle muscle.

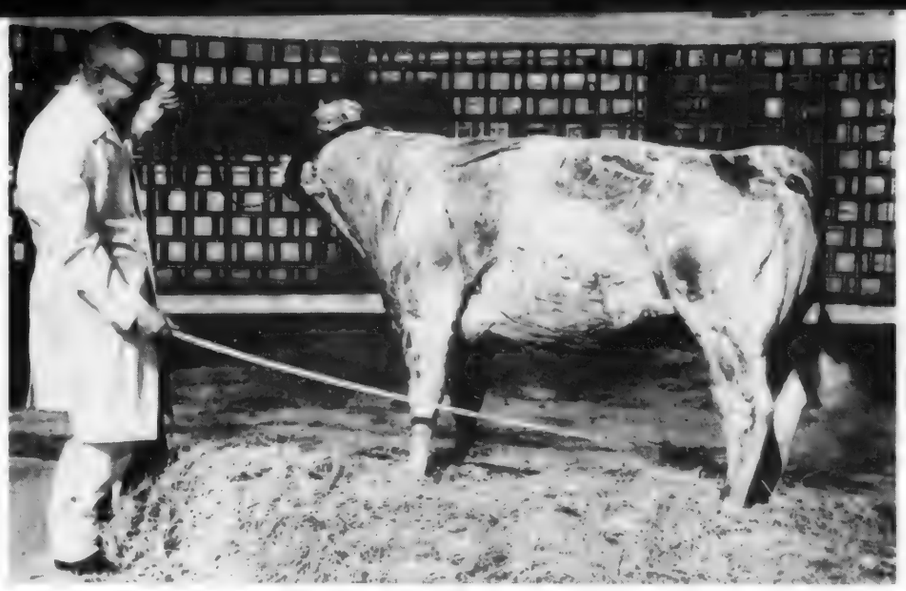
Or take the widely accepted idea that a good beef animal should be smooth over-all with a straight back. A release from the University of Maryland recently contradicted this without qualification. Attempting to describe the steer of tomorrow it said: "He will be longer and shallower bodied, less blocky with a curved back instead of the present flat-backed appearance so highly accepted in show cattle." Herkimer bears this out. A careful look shows there are two definite depressions in the back, one just behind the shoulder, the other right in front of the hooks. They can be leveled out, but only by the deposit of more fat. While the fat is being laid on there, it is increasing throughout the rest of the carcass.

Again, Herkimer seems to show a definite relationship between length of head and the length of rump. Yet for years breeders have favored short-headed cattle. Why? Cattlemen will be indebted to the man or institution that clears up this point.

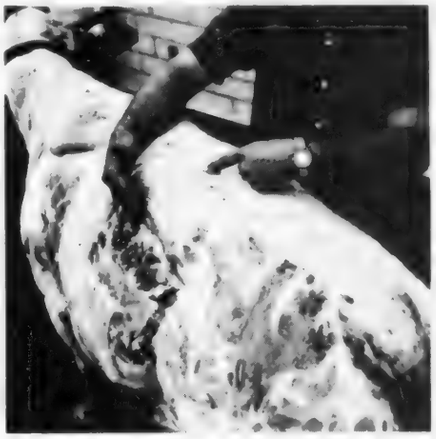
Similarly, breeders tried to maintain weight in their cattle while working for shorter legs and shorter bodies. The result was an animal wider in the back and deeper in the middle. Much of this width and depth was either fat or low quality meat fit only for hamburger.

Herkimer brings out all these points and asks a lot of other questions of real concern to the cattleman whose aim is the production of meat.

Best of all, Herk is still edible. He may yet wind up as guest of honor at a Texas Tech barbecue.



Dr. Fred Harbaugh's attempt at showmanship is met with icy resistance from Herkimer, Texas Tech's skinned and frozen steer. Herkimer himself raises a lot of questions in relation to accepted show standards. If red meat is the aim of beef production, how wide should the back be? There is only so much muscling in the loin (below left). Any additional width must be made up of fat. A smooth side (below center) is achieved by laying on fat and low quality muscling. As Henry Elliott, Tech graduate student, demonstrates, a good back is not straight (below, right). It has a natural depression behind the shoulder and in front of the hooks. A straight, smooth line can be achieved only by laying on fat.



A calipers applied to Herkimer's head and rump (left) seems to indicate a correlation between the length of these two parts. Do longer-headed cattle tend to have bigger rumps?

A smooth flank (left, opposite page) has eye appeal. But only a gaping hole remains (right, opposite page) when the fat is removed. The same is true of the fore flank (left, this page). Deep, full rounds, too, are pleasing to the eye, but much of that fullness may be merely an excessive interlarding of fat in those big muscle cavities (right, this page).

By Christopher Kelly

Artificial Marbling

BEAUTIFULLY MARBLED STEAKS can now be produced in a few seconds. The old idea that the marbling was a natural process requiring long feeding periods, with rations rich in corn, was knocked in the head last summer when Dr. Ralph Durham of Texas Technological College, Lubbock, went to work on the problem.

Durham, head of Tech's Animal Husbandry Department, has long been of the opinion that marbling makes little contribution to tenderness and flavor and, possibly, even little to juiciness. As a corollary to this, he has felt that the livestock feeder is wasting time and grain and the consumer is paying an unduly high price for beef which has been fed too long in an effort to produce a rib-eye with the degree of marbling required by present standards. Durham is also a leading proponent of the meat-type steer, the kind which carries lots of muscle and relatively little fat.

So, in an effort to satisfy the meat experts and the consumers who place a high value on marbling, and at the same time to try to produce that marbling more efficiently and without laying on excessive fat, he came up with the idea of a new approach. "If marbling is so important," he argued, "let's just pump it into the meat. Let's not waste a lot of time and feed in the feedlot making it, only to wind up with a wasty, overdone animal. Let's put the fat exactly where we want it."

He and his assistants in the Texas Tech meats laboratory heated up a pot full of tallow, got hold of a freshly-slaughtered Standard Grade steer and, using an ordinary ham pumping needle, pumped a few shots of hot tallow into the loin and rib area.

Instead of a uniformly rich marbling in the meat they got big, ugly-looking globs of fat. The tallow did not set up fast enough in the warm flesh and puddled badly when forced in in excessive amounts with only one needle. Some refinements were needed.

The next step was to try the process on a chilled carcass with multiple needles. It worked. With the meat at 39 degrees and the tallow at 145 degrees, a quick injection of the hot fat under 25 pounds pressure gave Standard beef the appearance of Prime. The fat set up immediately, right where it belonged and held its color and texture for days in the cooler. Even experienced butchers and meat packers were unable to distinguish the processed beef from that with natural marbling.

It ate well, too. Durham's friends, associates and ordinary passers-by, like this reporter, have been treated to generous portions of steak with processed marbling, and the concensus is that the taste and tenderness is of high quality. By some queer quirk of nature the injected fat seems to have a definite tenderizing effect even though the tenderizing influence of natural marbling appears questionable. Processed samples have scored better on shear tests than unprocessed samples from the same cuts. The evidence on this point, however, is not conclusive.

There are still a number of questions relative to technique yet to be answered. For example, what is the optimum percentage of fat to be added to the meat? Early in the development of the process Dale Zinn, a new addition to Tech's Animal Husbandry staff, stepped into the picture and has been doing most of the actual processing. Zinn has been injecting the fat with a five-pronged needle which he jabs into the meat in lines about an inch apart. He uses hot edible tallow to about eight percent of the weight of the meat.

Other questions yet to be answered are the optimum temperature for the fat and for the meat at the time of injection; whether the injection should be made before, after, or during the aging process; whether vegetable fats might not be as good as edible tallow. A very recent develop-

(*Continued on page* 116)

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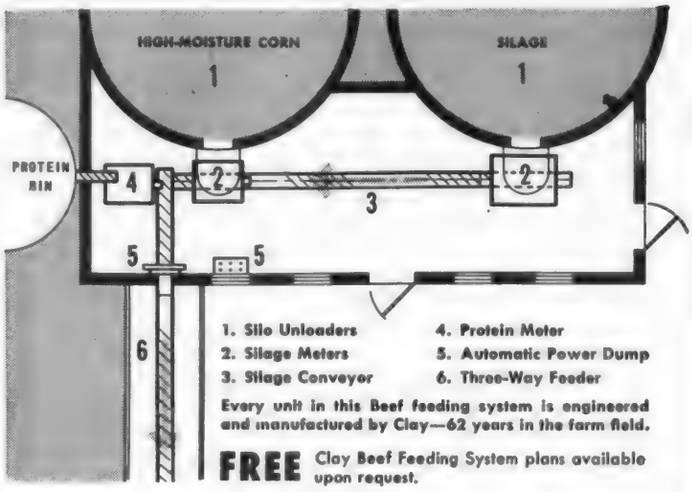

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VENTILATION AND DISEASE

(*Continued from page* 60)

wasteful. Above 81°, the body temperature of the chicken rises above its normal level, which averages 107.5°. At an air temperature of 90° the body temperature may be anywhere from ½° to 1½° above normal. Again feed efficiency goes down.

"Thus," explained Dr. Christie, "you have to pick a temperature in which the birds are going to grow to their maximum potential without wasting feed merely to keep themselves warm."

The engineer, then, designing a ventilation system for a chickenhouse, must have a system which will exchange enough air to remove the dangerous gases and moisture, and at the same time keep the temperature inside the building as close to the ideal as possible. All the solutions to date have been largely trial and error to design a system of fans, ducts or openings that come closest to providing the right airflow. There are two general methods. One group believes it is important to remove the noxious gases and, therefore, have exhaust fans to do this; another group contends that it's important to introduce fresh air, and have fans blowing into the building through a duct system to provide fresh air.

Changing Temperatures

In a totally enclosed, highly insulated poultry house using a system of exhaust fans, it is necessary to be able to alter the cubic feet of air moved every minute, as the temperature outside the building alters. This alteration or modulation can be achieved in two basic ways—either by changing the output of an individual fan, or by starting and stopping one or more of a group of fans.

You can't have a perfect modulation—there have to be steps in the increase or decrease of the airflow as fans start or stop. But you can keep these increases small when the outside air is very cold. Most experts believe one fan is not enough. Hugo Hillstrom of Cokato, Minnesota, engineer and researcher, who has designed and built many poultry houses, said, "If you had only one fan and it was big enough to handle the air movement required in summer, it would change the temperature too rapidly in winter.

"A single, modulated fan is not practical, so the choice is limited to a group of smaller fans. But you can also have too many fans—the power costs start to get out of hand. It's like trucking, the larger the truck, the cheaper the cost of a ton mile. You wouldn't haul ten tons in 20 half-ton pickups.

"It's ridiculous to use more than five to eight fans, no matter what size the building. The fan size should grow with the building size. They should be so controlled by a series of thermostats that they move increasing quantities of air as the temperature in the building rises.

"Air is matter," said Hillstrom, "and it must be distributed just like the feed and water and other matter in the chickenhouse. There are various ways of doing it, usually using a tube of some sort. Most of them are designed to introduce fresh air to the poultry house, without drafts on the birds, and at such a rate as to maintain the temperature as near to optimum as possible. Research indicates 55° to 60° is the optimum temperature for conversion of food into meat or eggs, even though this is slightly below the 61.7° level where chickens begin to eat more to keep warm.

"But I want to caution you on thermometers. A thermometer is a very unreliable indicator of conditions. What do I mean? Well, you can have the same temperature reading in two rooms and very different conditions in those rooms. For example, take a very well insulated room and a poorly insulated one. The poorly insulated building may be able to hold the heat at say 60°, but the fans couldn't run for they'd cool down the room. But the insulated building may allow the fans to run, refreshing the air and removing the odors.

"Air should be put into a room in such a way that the birds get the first crack at it. It's no use having the air go across the ceiling and out of the fan. It's got to go down where the birds are. The environment at bird level is most important. It may be that the temperature or humidity or even the air movement is completely different down where the birds are, than it is at the height of a human head. It's down at two feet that conditions count.

"When the temperature is high enough, air movement that was

New ideas for you will grow in this multimillion-dollar "greenhouse"

You're looking at the new Monsanto Research Center. Here, teams of research specialists from our Agricultural Chemicals Division search for new ideas and products to make farming more profitable for you . . . now and in the years ahead.

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2. **To stop the annual destruction of $125 million in crops by wild oats, Monsanto developed AVADEX®. It kills wild oats as they sprout, yet lets field crops flourish unharmed.**
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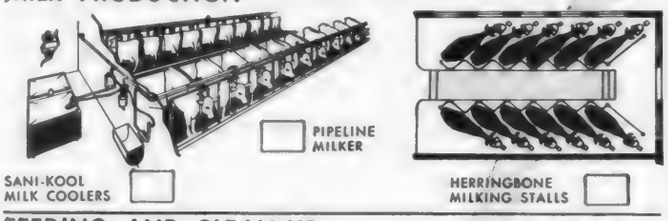
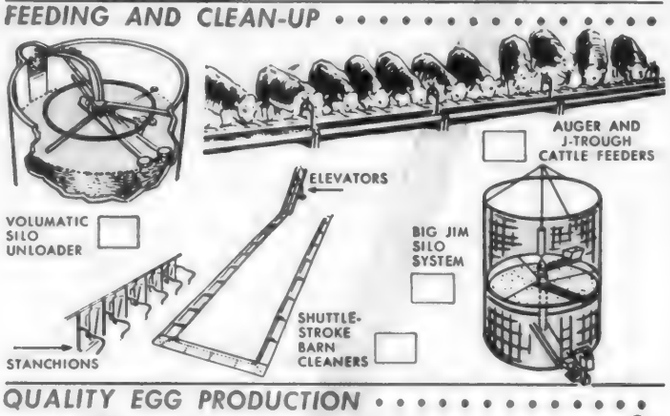
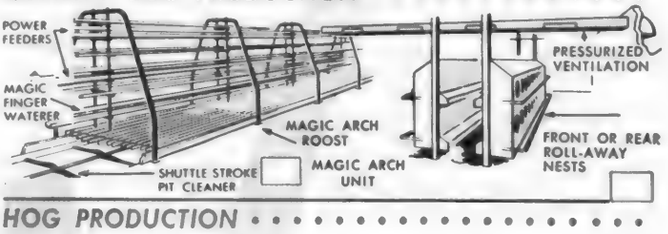
MILK PRODUCTION



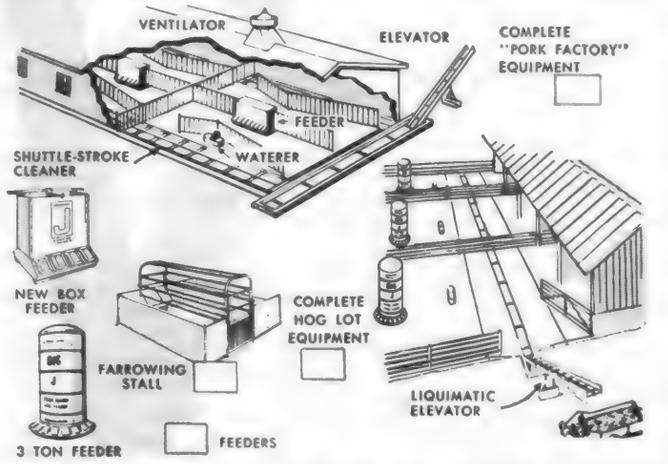
FEEDING AND CLEAN-UP



QUALITY EGG PRODUCTION



HOG PRODUCTION



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a draft when the building was cold becomes a desirable turbulence. But as the lower flow of air occurs when the air you bring in is cold (there are fewer fans working) there's less chance of trouble."

A fan in the side of a building isn't ventilation any longer in the poultry business. True ventilation is a complex, engineered system of fans, ducts and controlled inlets, in a well-insulated house. It is no longer a package the farmer can design—at least not the large majority of farmers. He has to take a manufactured package on trust. But, in the poultry industry, chances are he'll get a good one. However, even the best will not work well in a poorly insulated building. With other livestock, the fan in the hole in the wall is still the most common practice, and by far the least efficient. There's no doubt the chickenhouse is going to see even more improvement in the next few years, as research prowls around the problems of air movement and animal stress. By that time there'll be a lot more farrowing houses using a well-designed air system. And maybe more dairies will be putting in fans by system, not by guess and by gosh.

KNOWING WHERE YOU'RE GROWING

(*Continued from page* 65)

"Planning so the big investments start paying back right away is the real trick in making a big expansion program work out," say the Prines, who just this fall reached their goal of 100 cows in milk. The last thing they built, just ahead of the cropping season, was a big, pole hay shed with a feeding manger along the open south side. "We needed it before, but we did have hay storage in the old barns and so we did without it," they said. "Now that we are up to 100 cows it takes more time to milk, so the time and labor saved by the hay feeder is important. Most important, though, is we now have the volume of milk to pay for the building."

In all this, the Prines have come pretty close to the schedule for expansion worked out by Michigan State researchers. Here are the main steps for planning the big jump from 30 to 50 cows up to the next landing at somewhere between 80 and 120 head:

1. Grow out some extra heifers. If you lack room when they freshen, do some culling and sell the extra cows.
2. Buy or rent additional land.
3. To start in loose housing, begin with a pole barn to house an enlarged herd; continue to milk in stanchions.
4. Build one silo at a time. A trench can provide extra temporary storage. Or rent silo space from a neighbor.
5. Add to the concrete yard as the herd expands. (Sanitation codes have toughened, and will no doubt toughen more.)
6. Put off building the new milkhouse-milking parlor until expansion forces the change. This item pays only if utilized.

The Prines cut their costs by doing most of the building themselves. Even so, the total investment in extra land, cows, buildings and machine equipment comes to a total that few farmers with a herd of 30 to 50 cows would be able to raise in one lump sum. Investments for the jump to 100-cow size are listed by Dr. Brown:

	Per Cow
Lounging area (50 to 60 sq. ft.)	$60
Concrete yard, holding pen and feeding area (120 to 150 sq. ft.)	35
Silo capacity (6 to 10 tons)	70
Hay storage with a feeding area along the sides, capacity of 2 to 4 tons per cow ($4,000)	40
Auger bunk, 1 ft. per cow ($1,500)	15
Silo unloader ($1,500)	15
Milking parlor-milkhouse with plumbing, wiring, pipeline milker, bulk tank, well, etc. ($20,000)	200
Cows and replacements	350
Additional land (4 acres per cow until total reaches 350 to 450 tillable acres)	600
Farm machinery change to 4-row corn equipment, 4-plow tractor, large chopper, 2 self-unloading wagons, etc. ($15,000 increase in machinery investment)	150
Total new investment per cow	$1,535

To get from 35 cows to 100 cows will cost in the neighborhood of $100,000. And in most cases, says Dr. Brown, it will take eight to ten years to balance out the expanded operation so the extra investments will pay off according to plan.

The real starting point for expanding the dairy herd is not a new building or new milk equipment, but a candid financial

HERE'S WHY *galvanized* STEEL PRODUCTS *save you money!*

Galvanized steel fights corrosion . . . gives greater economy plus longer trouble-free life to farm buildings and equipment.

All galvanized products are excellent and give long service. The weight of the zinc coating determines the rust-free life for the application to be served, but this is not the whole story.

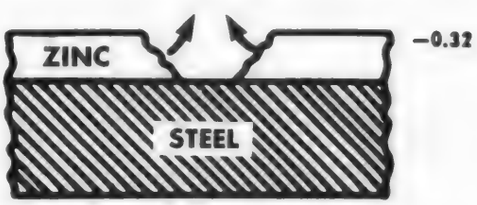
HOW GALVANIZING PROTECTS

Zinc on steel first prevents and later controls rust in two ways.

1) for long periods as a protective coating.

2) Later, when small areas of steel may become exposed, the attack of the elements is directed to the zinc. Though light rusting will finally occur, pitting and perforation are still a long way off. The illustrations at the left give a graphic picture of how zinc coatings work when small areas of steel become bare. You've probably seen examples on your farm. The following chart is a guide to the estimated life of galvanized roofing in the atmosphere. Siding lasts even longer.

This is what happens at a small exposed area in a coating of a metal having a lesser tendency to go into solution than the base metal. The steel rusts away, protecting the tin.



This is what happens at a small exposed area in a coating of a metal having a greater tendency to go into solution than the base metal. The zinc is slowly consumed while protecting the steel from any attack.

*ESTIMATED LIFE (before rusting) OF GALVANIZED SHEETS IN THE ATMOSPHERE

TOTAL ZINC COATING ON BOTH SIDES —OUNCES—	*Life in Years under Atmospheric Conditions*			
	Rural	Temperate Marine	Suburban	Highly Industrial
2.50	35	25	20	9
2.00	25	15	12	7
1.20	10	7	5	3
.74	7	5	4	2
.50	5	3	3	1

*Adapted from "Protective Coatings for Metals," American Chemical Society Monograph Series No. 129, Burns and Bradley.

WHERE IS GALVANIZED USED AND WHY?

In agriculture more and more galvanized steel is being used in various farm buildings, feeders, wire cribs, grain bins, wagons, elevators, water tanks, pipes, fence and other farm applications. Low initial cost, ease of forming and simplicity of application are just three of the basic reasons for the increasing use. In the case of roofing and siding, galvanized steel's strength, appearance, ease of application, fire resistance and economy has made it an important part of new construction as well as repair of older buildings on the farm. Your dealer can help you select the proper guage, pattern, weight of zinc coating, etc., that will give you the extra value that can be yours in all galvanized products for the farm.

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As a future aid to you in the selection of galvanized steel products, the American Zinc Institute has prepared a special reference file which is yours free of charge. This handy reference file covers selection and application, maintenance, repair and building tips, how and where to use metallic zinc paint and other guides that can be valuable in your farming operation. There is no obligation. Send the coupon below and have your reference file handy for future use.

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☐ Please send me the free reference file on galvanized steel and its uses. I understand there is no obligation for this material.

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Offer your livestock Sterling Blusalt, free choice, with plenty of water, and have Sterling Blusalt added to your custom mixes. As part of a well-rounded management program, Sterling Blusalt will help your cattle put on added weight—help beef up your profits.

But Blusalt is more than just a bonus part of a good feeding program; often it's a necessity. You see, few home-grown grains and roughages contain a proper balance of the trace elements beef animals must have for best health, growth and reproduction. But Sterling Blusalt does. What's more, it has these vital elements in the proportions nutritionists say are best for best health.

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statement of your present condition, says the Michigan State economist. Make due allowance for family living expense, then see what you have left to finance new investments.

The next step is to draw up a series of budgets to show how various changes in your scheme of operation would affect income. This usually calls for professional help. Several of the state agricultural colleges have trained extension workers to give this service. It is available, too, from private farm management consultants.

More cows, with more mechanization, is the trend in dairy farming and it is running strong. But how—and even whether—it will work for any one dairy farmer is a problem that each must work out on the basis of where he starts and what he is able to do.

BUSTING THE AUGER BARRIER

(*Continued from page* 76)

In our climate, however, we bog down during the coldest part of the winter when the manure freezes. Our solution was to dump corncobs onto the lot and when it warmed up, to bring the spreader into the lot and fill it with a tractor scoop. Even during the warm weather it has one drawback. That is, you don't always have time to haul and spread the manure each week, and you can't always get on your land. If I were doing it over, I'd try to plan a system where the manure could be pushed off the lot and held until we were free to get it on the land."

Another change they would make involves the fencing. The lot is enclosed and divided by fences made of 2 x 6's bolted to penta-treated posts. "If we were doing it again," Roger Gallup said, "I think we'd use cable instead of boards on the fence to avoid board breakage and to get more sunlight on the lot. During the winter the fence throws a shadow along the edge of the lot and the sun can't thaw out the manure back there.

"Another thing we are going to do is to put permanent partitions in the sheds to prevent draft. Last winter we found that these open sheds developed considerable drafts on the cattle. We were able to stop the drafts by putting in temporary partitions about every 50 feet. We are making these permanent partitions this year.

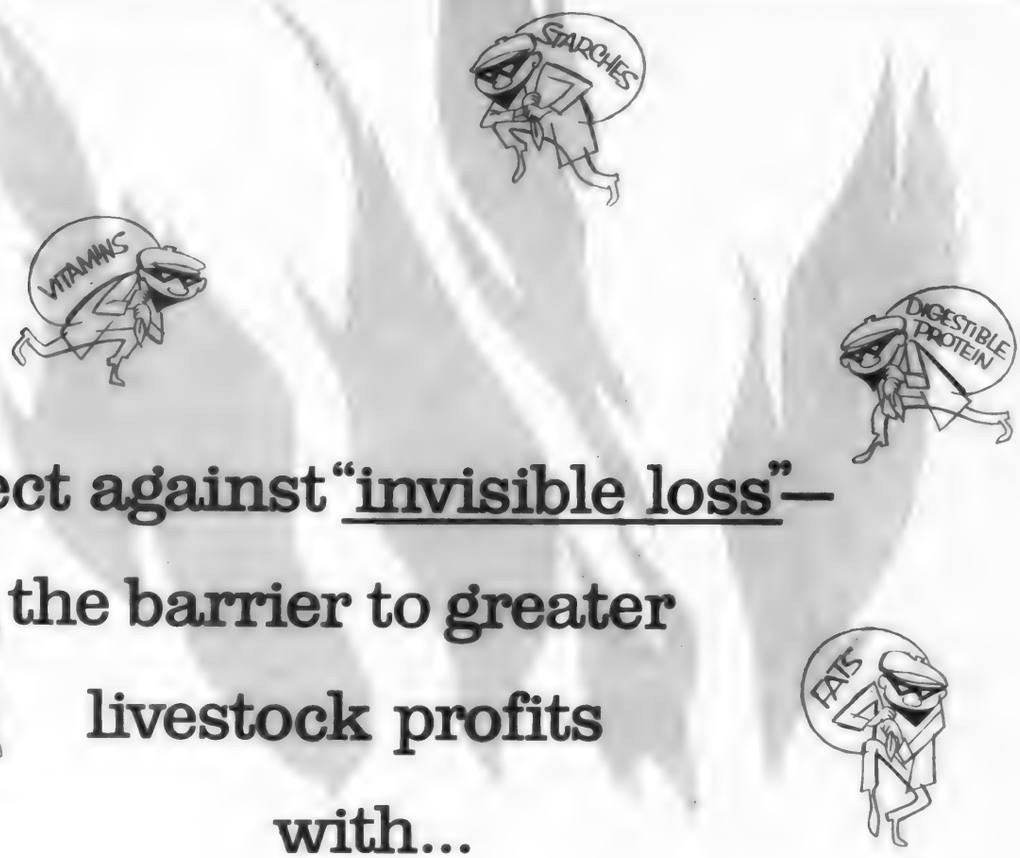
"Another thing we would know about if we were starting over," he continued, "would be to begin with a heavier motor on the Harvestore unloader. Actually that wouldn't be a problem now, for Harvestore has made the heavier motor standard equipment.

"I'm still not quite sure what we would do about the incline auger if we had to do it over again," Roger said. "We have the problem of raising the feed from the floor auger to about 10 feet above the floor to the distributing augers. We considered both an elevator and an inclined auger and decided on the auger. It gave us a lot of trouble at first because the haylage tended to wind around instead of moving up the auger. We finally solved this by fastening 2 x 4's along the open side of the U-tube. This keeps the haylage from wrapping around and keeps it moving up. The only trouble with this is that it's noisy as the devil. On the other hand, I don't know whether an elevator would be any better.

"In comparing this system with a self-unloading wagon system, these were some of the things I took into consideration," Roger Gallup said. "With a wagon system I would have to wait while the wagon is filled, and then drive out and feed the cattle. With this system the cattle are being fed as the haylage is being unloaded. In the wintertime, with the amount of snow and freezing we have here, I could foresee that we might have problems pulling a wagon alongside the bunk, and also that the cattle would have to be out in the open when they were feeding. Here I am protected, and the cattle feed under the roof which covers both augers.

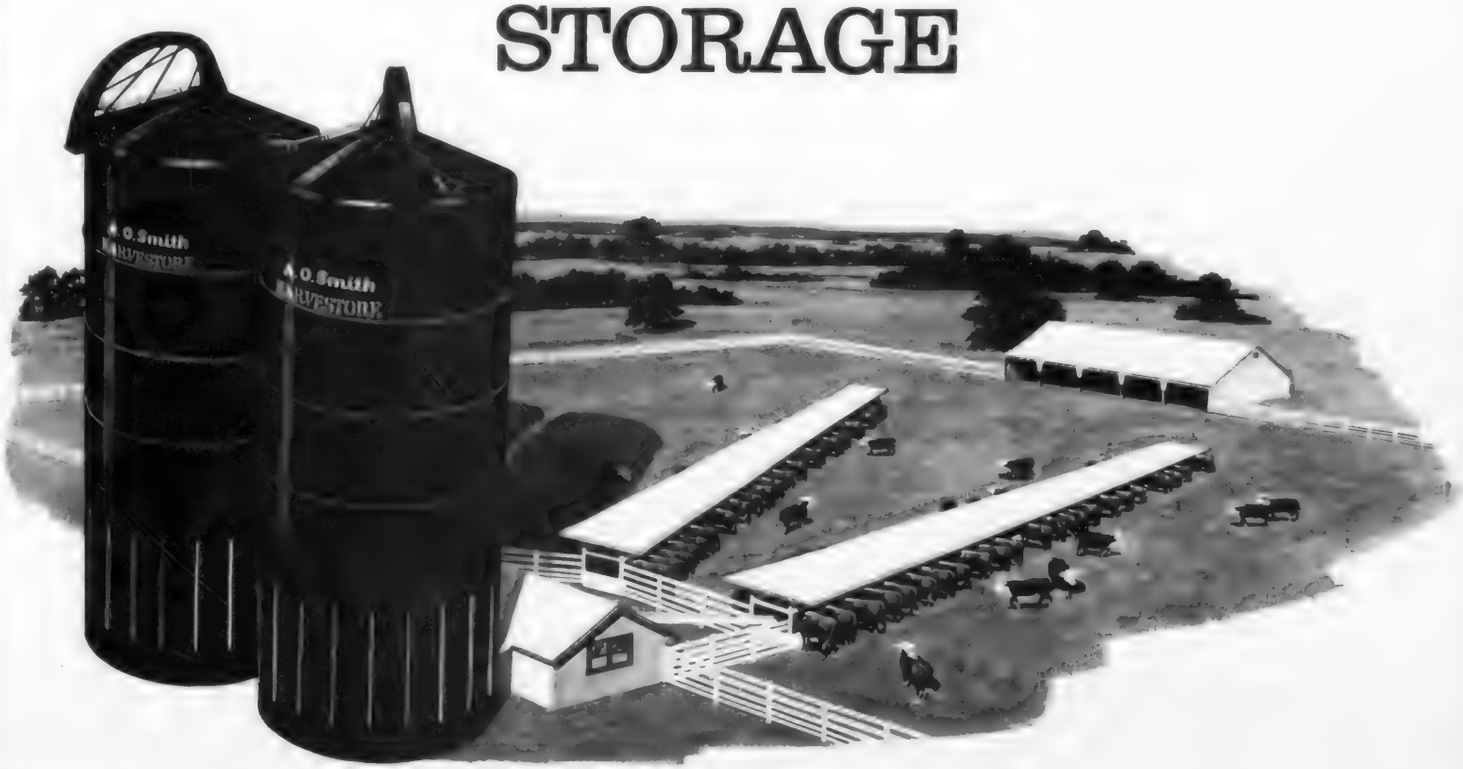
"We planned this system to increase our net income and to return the farm gradually to a two-man operation. This feeding system, I feel, will help us do it."

Dwight Gallup, who had been listening to his son, chuckled. "Yes, the plan was that the old man would do a little gardening and sit in the rocking chair reading the *Drover's Journal*. But so far, I haven't been forced into these joys of retirement."

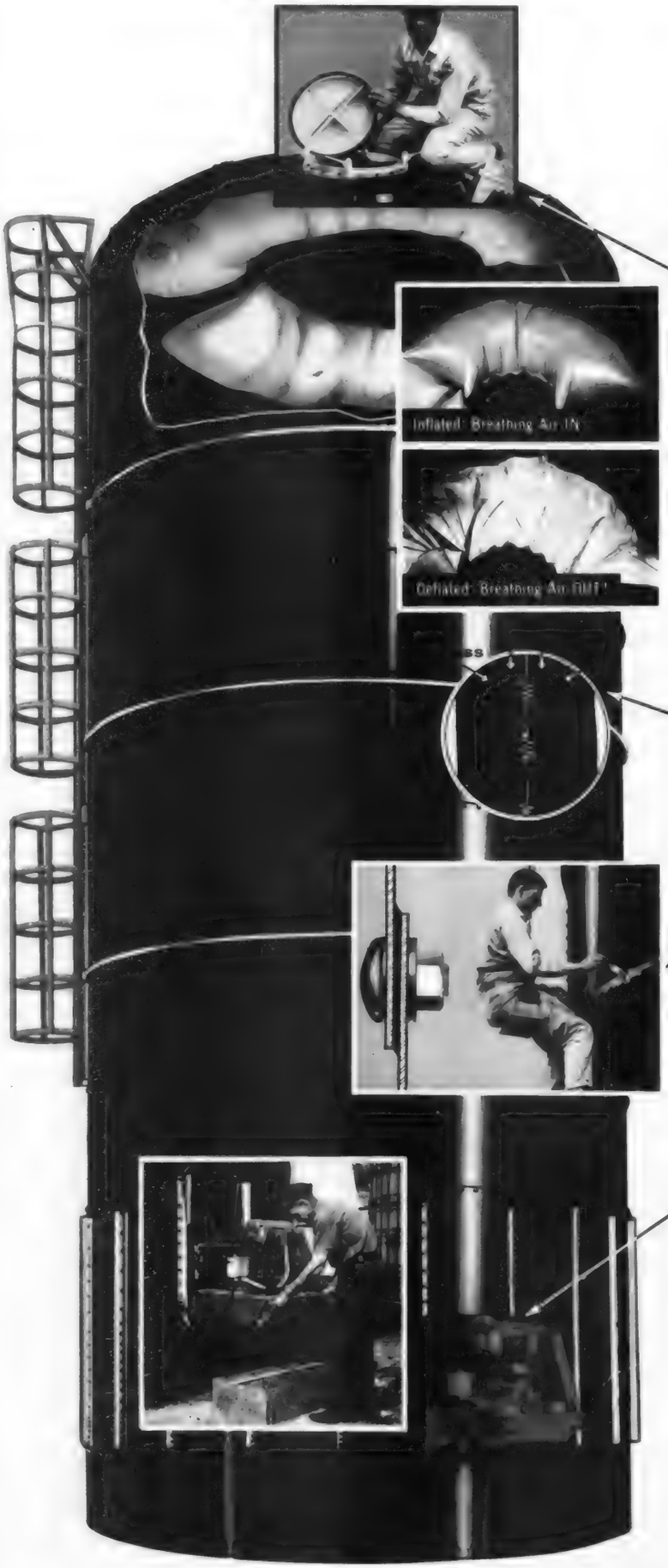


Protect against "invisible loss"— the barrier to greater livestock profits with...

HARVESTORE®
"OXYGEN-FREE" STORAGE



Can you afford to lose over ¼ of



HARVESTORE is engineered and built to provide true "oxygen-free" storage

Air-tight, marine type hatches seal air out of a HARVESTORE between fillings. What little air enters during fillings is quickly converted to carbon dioxide. In conventional upright storage of low moisture grass silage, even when attempts at sealing are used, the real hazard is during feeding. Then oxygen laden air freely circulates around the exposed feed so that valuable nutrients disappear, unseen into the air.

Pressure regulating breather bag system compensates for necessary internal gas pressure changes by "breathing" air in and out of the breather bags without allowing air to touch the feed. This exclusive HARVESTORE feature provides true "oxygen-free" storage of any forage or grain crop. Not true of a silo; air is allowed to contact feed, particularly during feeding, and can cause unseen loss and spoilage.

Glass-fused-to-steel construction keeps air out, too. A test conducted by the University of Massachusetts on the permeability of materials used in building silos shows that air can pass through the walls of a concrete silo but cannot penetrate the glass-lined steel walls of a HARVESTORE.

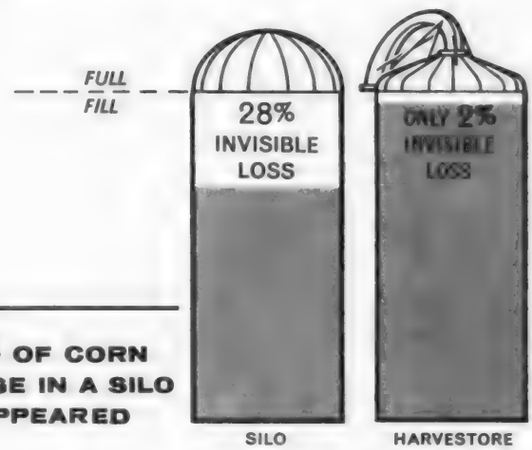
Expert sealing of joints assures that air is excluded from entering between the steel plates of a HARVESTORE. Factory-trained installation specialists place sections in an overlapping position, seal them with a special mastic compound, and securely bolt them to maintain uniform sealing power in all weather. In addition, all bolts and seams are air-pressure tested to make sure all joints are sealed. Not true of a silo; no special precautions are taken during installation to seal off air leaks.

Automatic bottom unloader opening is sealed to exclude air between feedings. Not true of a silo; with top unloading air can constantly contact feed.

"Live Storage" means continous storage —crop after crop. With a HARVESTORE you can fill in at the top and feed out at the bottom any time. This principle of the continuous storing and feeding of crops on a first-in, first-out basis means that you can often double and triple the tonnage of feed handled. In comparison, a conventional silo with top unloading is usually unloaded before filling and does not provide for this flexibility and economy in the storing and feeding of farm crops.

your ensiled feeds?... Of course you can't...Only "oxygen-free" storage can help prevent this invisible loss...Only HARVESTORE®

provides true "oxygen-free" storage



28% OF CORN SILAGE IN A SILO DISAPPEARED

In a recent on-the-farm feeding test held on the Little Brothers farm, Lowell, Indiana, fillings of corn silage from the same field were weighed into a HARVESTORE and a conventional upright silo. The silage was weighed out of each structure and fed to separate lots of cattle for a 112 day feeding period. Despite precautions to seal the silo, invisible and unseen loss claimed 28% of the corn silage stored in the silo. The HARVESTORE loss was less than 2%.

If you store low moisture grass silage or corn silage in a conventional upright silo, you can suffer such a loss. During a recent feeding test, invisible loss claimed 28% of the ensiled feed in a silo. On this basis, if you filled a 360-ton-capacity silo you could lose 100.8 tons of feed. Here's why...

Invisible loss—the result of air reaching feed in a conventional upright silo

This invisible loss occurs when ensiled feed is exposed to air. As the feed oxidizes, large amounts of dry matter and nutrients simply burn up and disappear. Such losses can be alarmingly huge. For each pound of feed lost to *visible* spoilage in a conventional upright silo, two or three additional pounds may be lost *invisibly*. In fact, invisible loss can occur without visible spoilage.

Plug up the cracks in a silo . . . cover it with plastic . . . but large amounts of air can still reach the feed, particularly during feeding, and cause invisible loss. The inability of a silo to prevent invisible loss can easily cost you thousands of profit dollars through wasted and weakened feed, reduced production, and higher feed costs.

HARVESTORE—the only effective protection against invisible loss

Not so with a HARVESTORE feed processing system; it practically eliminates invisible loss. Years of research went into the development of a structure incorporating the new principle of "oxygen-free" storage. Numerous quality checks are conducted during manufacturing and careful sealing and testing procedures during installation so that the HARVESTORE is properly sealed to exclude air. This is in direct contrast to a conventional upright silo which offers no new principle to exclude air.

The importance of "oxygen-free" storage in preventing invisible loss and retaining nutritive value is acknowledged by leading agricultural experiment stations. This authoritative support, plus on-the-farm research, points up two important facts: First, it's *invisible loss*—much more than visible spoilage—that makes it uneconomical to store low moisture grass silage or corn silage in a silo. Second, these feeds can be stored most profitably in a HARVESTORE.

The practical elimination of invisible loss is only one of many HARVESTORE advantages. With HARVESTORE "live storage," you can produce more meat or milk on the same acres with less labor and lower production costs. These advantages make possible *Push Button Profits* and are the direct result of two exclusive HARVESTORE features: "oxygen-free" storage and mechanical bottom unloading.

Rely on facts—not on unsupported claims

HARVESTORE advantages are revealed from dozens of research projects—both at colleges and on the farm. This factual evidence is collected and passed on to livestock farmers so they can base their decisions on the best possible information. It will pay you to see your HARVESTORE dealer. And don't let financing hold you up. If local financing is unavailable, your HARVESTORE dealer will be happy to present the HARVESTORE Purchase Plan. For full information, return the postage paid card.

. . . (TEAR OUT ALONG PERFORATED LINES) . . .

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TOWN_____ RFD_____

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☐ I am a student

"The additional income a HARVESTORE produces makes the investment pay for itself"

NOWERS' FARM BUREAU FARM MANAGEMENT RECORDS

	1959	*1960*	*Difference*
No. of cattle sold	143	156	+13
Lbs. of beef produced	89,259	134,854	+45,595
Bu. of corn fed to cattle	11,438	11,931	+493
Protein supplement purchased	$2,316.62	$1,764.40	−$552.22
Cost of 100 lbs. of gain	$ 18.06	$ 14.25	−$ 3.81
Return on investment (tenant)			13.59%
Return on investment (owner)			9.08%
Return per $100 feed cost	$ 126.00	$ 204.00	+$ 78.00
Bu. of corn purchased	3,790	4,356	+566
No. of hogs sold	219	324	+105
Lbs. of pork produced	60,050	77,000	+16,950

Return on investment totals 22%. According to Mr. Nowers, "The only difference between 1959 and 1960 was two fillings of a 20 x 50 foot HARVESTORE with Haylage. This required three cuttings of 50 acres of alfalfa and produced 45,595 more lbs. of beef. At 25¢ per lb. this amounted to $11,399 or $228 return per acre from alfalfa as Haylage. The additional 493 bushels of corn were offset by the $552.22 less supplement purchased."

. . . says THOMAS F. NOWERS, executive vice-president and director, Atkinson Trust & Savings Bank, Atkinson, Illinois. Long-time farm ownership, plus 50 years of banking experience makes Mr. Nowers an unusually well-qualified judge of HARVESTORE's financial advantages. And his judgments are proved by a study of his own HARVESTORE-equipped farm. He goes on to say . . . "Every acre harvested and fed through a HARVESTORE will return 50% to 100% more net income than conventional storing and feeding methods. The average HARVESTORE owner can double his production, lower his cost of gain 25%, and reduce his labor at least 50% in an average year.

"In 1958 and 1959, Leonard Moens, my tenant, and I added two 20 x 50 foot HARVESTORES to my farm—one for high moisture shelled corn, one for haylage and corn silage. By studying our operation, we found our HARVESTORES gave us a rate of return on investment of 22% and increased return per acre to $228 for cattle feeding alone. (For complete details, see chart at left.)

"Based on my experience as both a banker and a farm owner, I am convinced HARVESTORE is far ahead of any other crop harvesting, storing, or feeding method. Of the many startling advancements in agriculture during the last few years, HARVESTORE stands alone at the top."

What college researchers say about invisible loss in a conventional upright silo

Purdue University: Mimeo AS-299, "*Alfalfa Hay vs. Two Types of Alfalfa Haylage vs. Alfalfa Silage Fed With and Without Supplement in a Fattening Ration for Steer Calves.*" "Haylage (low moisture forage) stored in an open top concrete silo was inferior to hay or HARVESTORE haylage, when fed either with or without supplemental protein. Difficulty was experienced in feeding the open silo haylage rapidly enough to keep ahead of some spoilage. Cattle on open silo haylage would not consume as much corn as those fed hay or HARVESTORE haylage."

From a Speech, "*Results of Forage Feeding Methods and Comments on Stored Forage Feeding,*" by Russell Johannes, Superintendent, Marshfield Branch Agricultural Experimental Station, **University of Wisconsin.** "Just putting in low range moisture material (forage) is not what alone will give a good product. This along with perfect exclusion of oxygen will help in giving a low fermentation factor, a high food value retention, and a high consumption figure. However, if air is allowed to reach this mass we get a high temperature type of fermentation which will greatly reduce the feed value and, according to all information we have at our disposal, cut down greatly on digestibility."

Abstract of Paper, "*Silage Storage Losses,*" presented at First Regional Sealed Storage and Silage Conference by Oscar E. Olson, South Dakota Agricultural Experiment Station, **South Dakota State College.** "The South Dakota experiments have clearly shown the importance of the exclusion of oxygen from ensiled forage in the prevention of nutrient losses. While this factor alone cannot determine what method of storage a farmer should use, it is of major importance and should be given first order recognition in deciding what type of silo to use."

Michigan State University: Bulletin AH-36, "*A Comparison of the Feeding Value of Ensiled High Moisture Artificially Dried and Naturally Dried Corn for Fattening Steers.*" "Yearling steers were sorted as uniformly as possible into six lots of 10 steers each according to weight and type. One lot was discontinued after a short time. They were being fed from a conventional silo and it was necessary to feed so much extra corn otherwise to stay ahead of spoilage that the supply was exhausted and the test closed."

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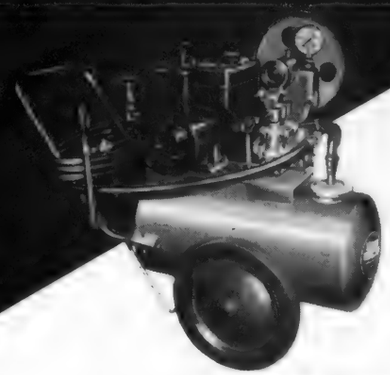

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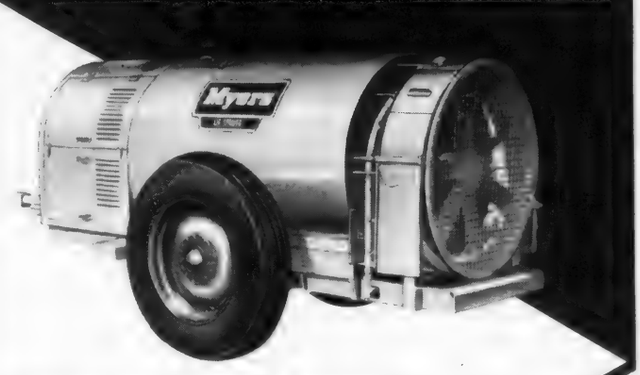

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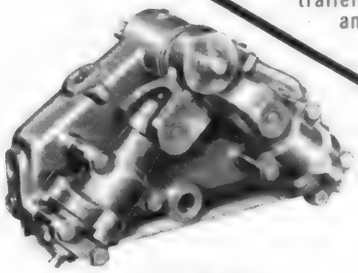

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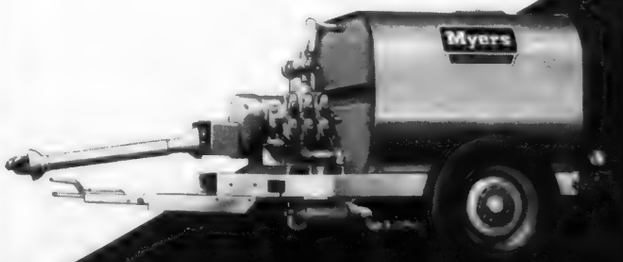

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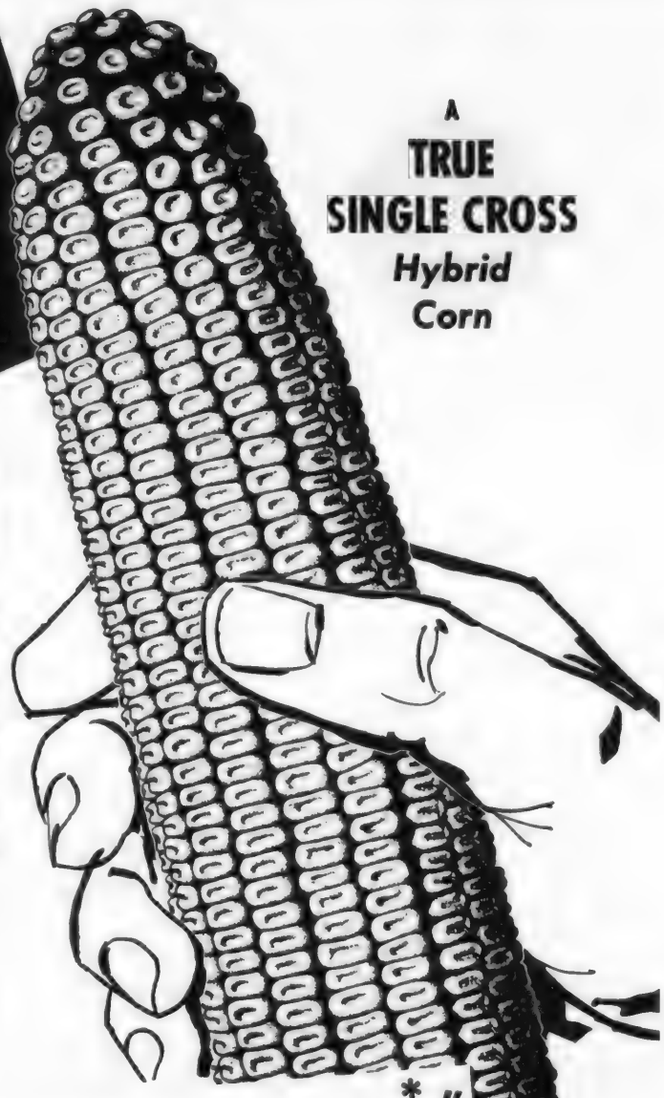

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Rank	Location	805 yield	Test average	805 margin
First (1960)	Western Kansas	151.9 bu.	123.3 bu.	+28.6 bu.
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First (1960)	Central Missouri	119.9 bu.	104.3 bu.	+15.6 bu.
First (5 yrs.)	West N.C. Ill.	131.8 bu.	120.8 bu.	+11.0 bu.
First (3 yrs.)	North Central Ind.	127.0 bu.	108.3 bu.	+18.7 bu.
First (2 yrs.)	Eastern Iowa	139.0 bu.	120.9 bu.	+18.1 bu.
First (3 yrs.)	Northern Mo.	118.5 bu.	105.1 bu.	+13.4 bu.

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MANURE PAYS OFF

(*Continued from page* 97)

$2 per hour counting the fringe benefits."

Last year Dick figured the company's cost per bag percentage-wise at 67.61 percent of the 26 cents received per bag. Broken down, this means 39.82 percent went for the fertilizer, 19.52 percent for labor, 2.25 percent for supplies and freight, .18 percent for equipment, 3.04 percent for maintenance, 1.48 percent for utilities and 1.27 percent for depreciation.

This left a gross profit of 7.4 cents a bag. Taxes took almost one-third of this, leaving a net of about 5 cents a bag, or some $13,750 which the company used to pay a 10 percent dividend on the stock to the seven partners, plus retiring a tenth of the loan.

The sale of 8,500 to 9,000 tons of manure at $3 per ton has brought a gross income of between $25,000 and $27,000 to the McDougal Livestock Company.

"We quit selling to outside truckers out of the feedlot pens," Mac said. "Now the men concentrate on moving the manure out themselves during the dry season from June to November. One man scrapes and piles the manure. One or two manure spreaders haul and spread on the pastures. During September we concentrate on building the compost pile."

McDougal doesn't figure his manure return at so much per head because he doesn't harvest all of it. He has for years added manure to huge piles in each feedyard as a place for the cattle to stand and lie during wet weather. "It saves the steers a lot of discomfort and helps keep them gaining.

"I know there are 500,000 tons of manure in these piles accumulated over the years" Mac said, "but they aren't for sale."

McDougal has spread some 4,000 tons of manure per year on pasture and rangeland since 1941. "We haul it out as the weather permits," Mac said. "On alfalfa ground we put 20 tons per acre per year. We found the manure application increased the pounds of beef per acre by 400 pounds over unfertilized fields. We have carried three steers per acre.

"On the upland drylands 20 tons per acre every five years has doubled the carrying capacity. We boosted the gain from this land to 200 pounds per acre. And another thing, this manure application warmed the ground, and we got earlier grass.

"We spread the manure on with a bobtail and with truck—semimanure spreaders. The semi has an auxiliary motor to power the rear spreader. We start spreading about June 1, and continue, weather permitting, through November or until the rains come. This heavy application has had excellent residual effects for the five years between applications," Mac said.

McDougal is changing his fertilizer program now to apply five tons of manure per year on 1,000 acres, rather than 20 tons on 200 acres. With a lighter application, he feels he can keep a supply of fertilizer going into the soil annually, which he thinks will again improve the grass response.

This 20-ton per acre application costs McDougal $12 to $15 per acre, or about 65 to 75 cents per ton.

"So you think 75 cents per ton sounds too low," Mac said, "Well, figure it out." He jotted down the following:

Two men at $2 per hour, 9 hrs. each	$36.00
$15 per truck charge per day— 2 trucks	$30.00
Tracto-loader charged out at	$10.00
Total	$76.00

"One man runs the long semispreader. This rig hauls 10 tons per trip. The smaller spreader will haul four tons, making a total of 14 tons. They average a trip per hour, or 126 tons in a 9-hour day. Divide 126 tons into a total cost of $76—makes the cost per ton a bit under 75 cents. We have contracted this out at times to private operators for $1 per ton."

A few feedlots have tried bagging feedlot manure. Among them are the Moffett Feedyard at Manteca and the Wolfsen Feedlot at Los Banos. These feedlots have contracted their manure out to processing firms. However, they have found the competition very rough as they are farther south and feel the stiff sales program of the Los Angeles dairy manure bagging companies.

Many feedlot operators haven't felt the

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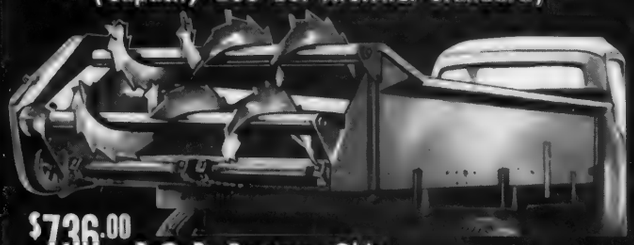

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garden market was worth going after, and have sold most of their manure to truckers for delivery to row crop farms and orchards.

However, the Collinsville Fertilizer Company has pointed the way for more efficient handling of feedlot manure by finding more market outlets and uses for one of nature's best soil conditioners.

ARTIFICIAL MARBLING

(*Continued from page* 102)

ment in the research work has been the use of a blend of corn (milo, or cottonseed) oil with the beef tallow (about 35 percent vegetable oil, 65 percent beef tallow). Not only may this serve to overcome some of the current resistance to animal fats in the human diet, but it also seems to give a better color to the processed marbling.

The implications of the marbling process are as important economically as they are physiologically. As Durham anticipates the eventual use of his process, the loin, round, rump, rib and chuck would be injected. Every ounce of fat on the standard carcass, as he sees it, could either be ground in hamburger or injected into better cuts.

Presently the profits inherent in the situation are extremely interesting. A simplified example gives an idea of what the process could mean in dollars and cents at today's price relationships:

Take a 600-pound Standard carcass which could be expected to yield 62 percent high-priced cuts. This would give 372 pounds in these better cuts. If 8 percent tallow were added to these cuts in the marbling process, their total weight would be 402 pounds (approximately 30 pounds of tallow would be added). This would actually result in a cut-out of 67 percent high priced cuts.

The cost of the Standard carcass could be estimated to run around 32¢, or $192 for a 600-pound carcass. The processed cuts could be expected to bring 80¢ a pound wholesale, or $321.60 for the 402 pounds.

At 8½¢ a pound, the 30 pounds of fat pumped into the cuts would cost $2.55.

A high Choice carcass might only be expected to yield 55 percent high-priced cuts. This would amount to 330 pounds of meat. At 37 cents the carcass would cost $222; the 330 pounds of better cuts at 80¢ would return $264.

So we have the following comparison:

Standard Carcass 600 pounds—
Cost at 32¢ $192.00
30 pounds tallow at 8½¢ 2.55
Total cost $194.55
Yield:
402 pounds better cuts at 80¢ .. $321.60
Less cost 194.55
Profit from high-priced cuts alone $127.05

Choice Carcass 600 pounds—
Cost at 37¢ $222.00
Yield:
330 pounds better cuts at 80¢ .. $264.00
Less cost 222.00
Profit from high priced cuts alone $42.00

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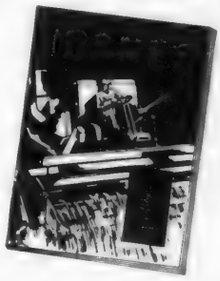

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Cattle marketing
Chlorination
Circular-type hay driers
Combine, corn harvesting
Commodity Credit Corporation
Conditioners, hay
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Corn, grinding, for livestock feed
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Depreciation
Drylot dairying
Elevators, feed handling
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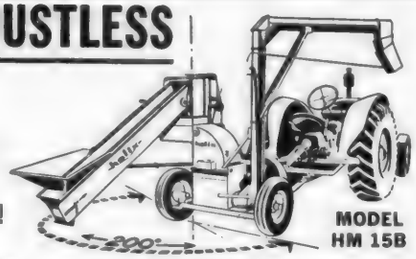
Grinds twice as fast as most feed mills—up to 450 bushels of ear corn per hour!



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New Helix Hammermill has an underslung power auger that moves feed out of mill *fast*—without dust. Replaces limited-capacity discharge fans and dust collectors. Since there is no feed separation or undesirable fines, feed quality and palatability is upgraded. One man with one tractor and the Helix Hammermill can grind 450 bushels of ear corn per hour, either dry or high-moisture. That's double the speed of most other machines.

Helix Hammermill handles Purdue-recommended chunked high-moisture ear corn*—grinds to any feed size—and keeps ahead of two 2-row pickers. Have your dealer show you what the big-capacity Helix Hammermill can do—on your own place. It's also available in combination with the new Helix Grinder-Mixer that grinds, mixes, blends, unloads *2 tons of feed in 20 minutes!*

**Put on bigger gains at 35% moisture than the same quantity of shelled corn.*

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Crown Point, Ind. Dept. 2-Y

Thus on the basis of the high-priced cuts alone the Standard carcass subjected to the marbling process would net $85.05 more than the Choice carcass of the same weight.

As we go to press, the marbling process is barely four months old. As has been suggested there is still much to be learned about it. The meat inspection people and Food and Drug may want to take a good look at it, though basically the process consists of nothing more than transferring the animal's waste fat to those parts of his anatomy where it is usable.

Durham still insists that all the consumer really wants in meat is good, solid red muscling. "But if he still insists he wants marbling," he says, "we'll give it to him the cheap, modern, efficient way."

DRAFT AND DRIFT CONTROL

(*Continued from page* 69)

snow accumulation on the models. To photograph the wind they injected a mixture of aluminum powder and liquid detergent through a hypodermic needle at specific places around the building. The gray liquid swirled and turned, following the path of the water as it enveloped the plastic model. The exact path that the wind would take was easily visible, and the swirls of the injection reflected the turbulence caused by the building and roof shape.

What have the tests shown? "Well, firstly," emphasizes Theakston, "the research is far from complete. We know how snow and wind behave in many of the commoner shapes of buildings and around barns and silos. All buildings have something of a snow and wind problem. We hope we can develop a new building design, especially a roof design, to minimize wind problems.

"It's not foolproof. You can't get a setup that won't let some snow build up in, or around buildings, but modern designs of buildings have dictated that open-front structures be used in loose housing. New designs of trusses in roof shapes are causing trouble. Because existing buildings have been used, sometimes in the worst position possible, snow and wind conditions have often been bad around the farmstead.

"The snow problem around modern buildings has been going on for eight or ten years. Many farmers in the north have accepted it, but haven't been able to do much about it except block off the front of the building during severe weather. Snow and wind causes health problems with animals lying in drafts, and sanitation problems because snow or rain blowing inside a building makes it useless for housing. There's physical damage to the building, too. Snow accumulates on certain sections of the roof. If it gets too heavy it causes collapse. Under certain wind conditions buildings actually turn over, due to the tremendous pressure."

Some of the answers that Theakston and Underwood have produced so far are:

Snow Fences (1) Snow fences should be more than 60 feet from a building. If they

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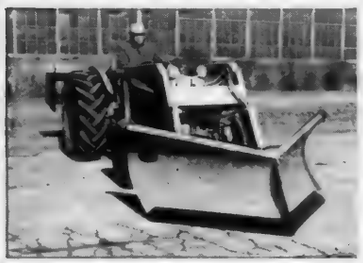

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If it's a respiratory infection, first comes the wheezing—then the herd goes off feed. Respiratory infections spread fast. Left unchecked, cattle lose weight—and pneumonia may set in.

The trouble? Could be shipping fever which can hit any time bad weather or other stress comes along. Or, it might be any one of the many other diseases that show similar signs before specific symptoms develop.

That's why it pays to call your veterinarian at the *first* sign of trouble. He's the only one qualified to diagnose diseases such as these, and prescribe the proper treatment.

Against respiratory diseases, he may use a modern, broad-range antibiotic like Liquamycin* Injectable—because it's also effective against mixed bacterial infections** often associated with respiratory diseases.

What can you do?

Newly-arrived cattle, in particular, are often a source of trouble. You can spot trouble early by keeping them separate and watching closely. If problems come up, call your veterinarian—and follow his instructions carefully.

Other ways to avoid costly losses in new arrivals are: allow complete rest in well-bedded, open sheds; feed plenty of good-quality nonlegume roughage with gradual addition of concentrates; avoid handling or other stresses especially during the adjustment period.

And keep particular watch over cattle during the fall and winter when weather conditions and other stresses can bring on respiratory problems. It's another case when an ounce of prevention can eliminate the need for a pound of cure.

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are less, some of the snow will roll over the building and into an open front. With the fence beyond 60 feet it does its proper job, making some of the snow fall out before it reaches the building. The windbreak should extend 30 feet beyond the width of the building on each side.

(2) Snow fences should be six to eight feet high, probably depending a lot on the farmstead. If it is mainly low buildings, six feet is all right. If there are several two-story buildings use an eight-foot fence.

(3) There has been some work done in Scotland on the best density of a snow fence. This work showed that under Scottish conditions the ideal snow fence consisted of 40 percent wood and 60 percent spaces between the wood. It didn't matter whether the slats were horizontal or vertical.

Structure Spacing (1) Don't put a silo too near the front of an open building. If the gap between silo and building is less than 35 feet it will plug up solid with snow in a bad storm. Some farmers have had to close in the area completely because it became absolutely unusable after snow. The silo should be on a downwind corner from a building 35 or more feet away.

(2) As you would suspect, the open front of a building should always face away from the wind. Usually this means the open front should face south or east.

(3) Don't place buildings closer to each other than 100 feet; (a) because of fire hazards, (b) because of snow effect. "Some people say 50 to 100 feet," said Theakston, "but I feel 50 is pretty close." If the buildings are too close together, snow builds up between the sides. The same thing happens in an open, horizontal silo, or carport.

Where buildings and fences are wide apart the wind sweeps straight through without corner effects and turbulence.

Fences. Snow piles up behind any upright fence. Don't run any fences straight from the side of an open building.

"There's quite a trend toward self-feeding hay storage here in Ontario, and it's very much affected by wind and snow. If the site is too windy the animals won't stay there to eat, and if it snows it can plug up the feeder," said Theakston. "It's important not to have the hayfeeder downwind from, and too close to another building. You can't set up any building to be protected from all sides. You have to close the whole thing in," said Underwood, "but the prevailing winds usually vary through about 90°. Therefore you can place a snow fence across two sides, or diagonally across the corner of a building."

Snow Inside Buildings. Snow tends to build up inside buildings particularly when the wind is from a diagonal corner. The snow rolls over the top of the roof, curls under the opposite end of the building, sweeping round to the back of the building and out the front again. The best way to control this is to put partitions inside the building. Two partitions, splitting the building into thirds, help in any building over 50 feet long. Partitions counteract the suction effect which draws in snow. Small buildings are better than big ones as the suction effect is not as great. "Buildup of snow inside buildings can sometimes be tremendous," said Theakston. "One farmer near here, against all our advice, put an open building facing northwest—right into the wind. I went out the first snowstorm and it was plugged up solid with snow. There wasn't an animal in there."

Feedbunks. Strong winds can actually remove the feed from badly designed bunks. One case which the researchers studied was a lazy susan bunk around a tower silo. The wind was such that it pulled feed from the downwind side of the bunk and scattered it all over the farmstead. Theakston and Underwood set up a plastic model of this silo in their water flume and exactly duplicated the feed-spreading "wind" with water and sand. Then they were able to show that a hood over the circular bunk almost completely prevented the waste.

Underwood summed up all the work by adding yet another of their problems. "The hard part is that people want everything square, the buildings and the layout of the farmstead. Unfortunately, in some cases the best layout may be on an angle, and the best building may be curved."

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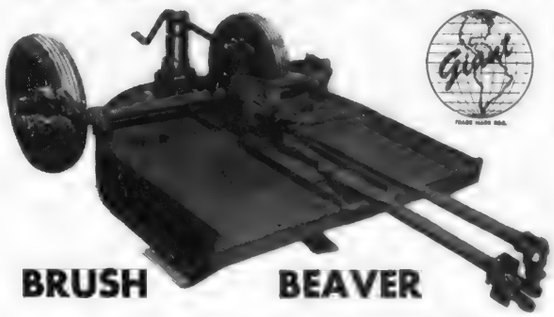

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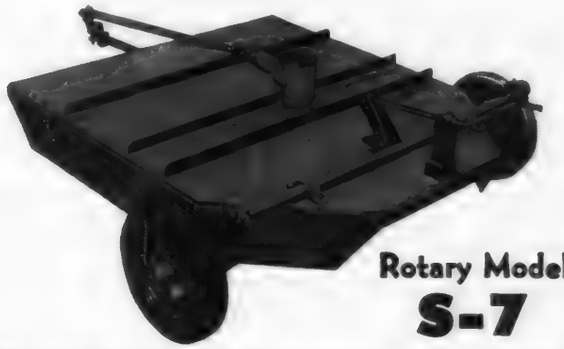

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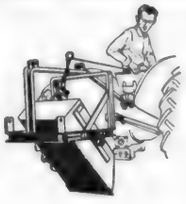

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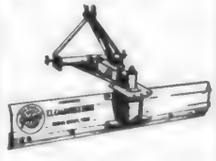

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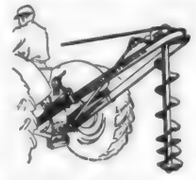

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By Bill Lamme

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THEODORE DE SAUSSURE

(*Continued from page* 90)

of scholars, scientists, and technicians.

The wealthy de Saussure family fled from France in the middle of the 16th century to avoid religious persecution and established themselves in the Republic of Geneva, in what is today a part of Switzerland. The grandfather, Nicolas de Saussure, after whom Nicolas Theodore was named—though he usually went by the name Theodore to avoid confusion—was a wealthy landowner who studied agriculture and published a number of papers on the management of vineyards, the making of wine and the causes of crop failure.

Nicolas Theodore's father, Horace de Saussure, was the celebrated Alpinist whose work in the early study of geology and meteorology is still considered basically correct. Horace de Saussure invented a number of scientific instruments, among them the hair hygrometer, a refinement of which is in use today. He also devised an underwater thermometer for measuring the temperature at any depth below the surface.

Nicolas Theodore, born on February 14, 1767, in the elegant three-storied family townhouse, was the second child of Horace de Saussure and his wife, Albertine Boissier de Saussure, a woman of great wealth and personal charm. The first child, a daughter, Albertine, was an unusually beautiful and brilliant girl who in later life married Jacques Necker, a nephew of the great French financier.

From earliest childhood, Theodore became his father's companion and scientific apprentice. He also shared in the political dangers of the wealthy family of that period. When he was 15 his father was arrested and held hostage by a mob who took over the city hall. On his release he arranged for the escape of Albertine, Theodore and his younger son, Alphonse. They first tried to leave Geneva disguised as peasants, Theodore carrying a hoe and a huge farm basket. They were recognized and turned back.

A few days later when they made their escape, Albertine was disguised as a lady's maid, Theodore as a workman, and Alphonse as a ragamuffin. They slipped into France and lived with friends, the Fabre family, for a few months until things had settled down again in Geneva. Years later, incidentally, Theodore married a daughter of this family, Renee Fabre.

Most of Nicolas Theodore's schooling took place in this home and in the family's country estate under the guidance of his father, who thoroughly disapproved of the public schools of that time. Theodore did, however, attend l'Academie de Geneve. Working with his father, he became expert in the use of scientific instruments, particularly the great glass flask for collecting and studying gases, the eudiometer, a tool that was to prove most useful to him in his later studies on plant nutrition and growth.

In 1788 when Horace de Saussure climbed the bleak stone outcroppings, chopped a path across the glacier, and finally conquered Mont Blanc, Nicolas stayed at the base of the mountain. Here he made careful meteorological observations with thermometers, hygrometers, barometers, and devices for measuring haze to compare with the similar observations his father was making at the high altitudes.

The following summer father and son climbed to the high Alpine pass, Col du Geant, where they lived for 17 freezing, storm-wracked days, making hourly observations day and night.

The influence of the father is apparent in Theodore's first scientific papers in 1790. With eudiometers he collected, studied, and wrote on density of air at different altitudes.

During this period of development, another scientist was having a profound influence on Theodore's life. The librarian of Geneva, Jean Senebier, the friend and biographer of Horace de Saussure, was carrying on experiments which showed the absorption of carbon dioxide by the leaf of the plant, and the release of oxygen during the process. Nicolas Theodore was a most interested observer of this pioneering work.

It was through the expansion, refinement, and perfection of the line of experiments begun by Senebier that Theodore de Saussure was able to make his greatest contribution to agricultural science.

Turning from his studies of the nature of the air at different altitudes, de Saussure began the study of the exchange of gases between plants and the atmosphere which

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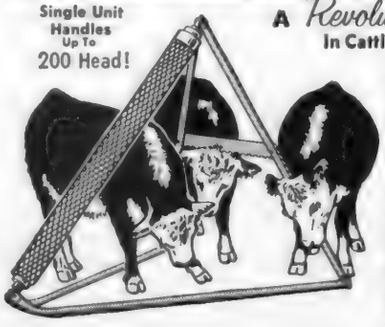

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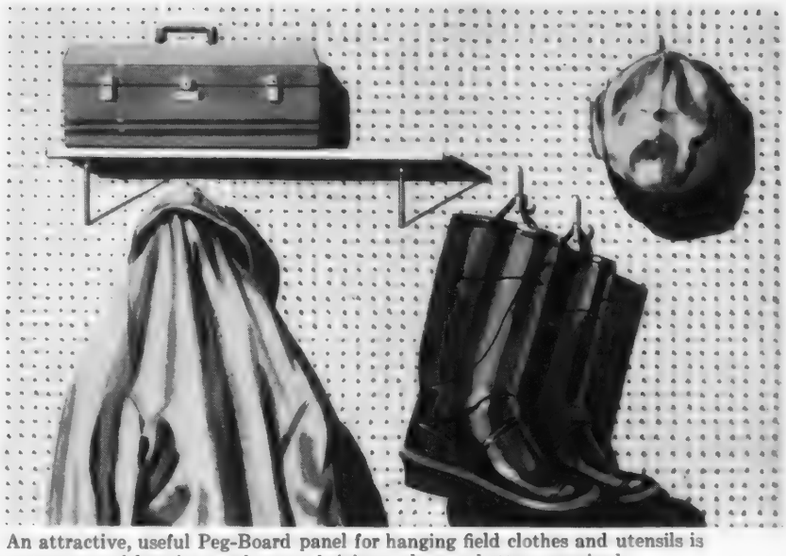

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surrounds them. This he did with meticulous care and great exactness.

Leaves, branches, roots and the flowering parts of plants he enclosed in his flasks in order to study their reactions in isolation. The composition, and the volume of the air which surrounded them were measured as they carried on their life processes. They were systematically subjected to unusual conditions such as changing the proportions of the elements of the air in order to note how the plants reacted.

From these experiments de Saussure did not attempt to give final answers as to the food of the plants, but he noted that water and air contribute more to the formation of the dry substance of plants which grow on fertile soil than the minerals which they absorb through their roots. He also noted that in sunlight the plants, through their leaves, absorb carbon dioxide which is combined with the water absorbed through their roots to form the first simple sugars. A byproduct of this combination, he pointed out, is the release of oxygen to the air (which Priestley had discovered some 20 years earlier). In darkness, de Saussure found the plant absorbs oxygen from the air through its leaf surfaces and gives off carbon dioxide. In other words this was respiration, much like the breathing of animals.

His experiments showed the carbon dioxide of the atmosphere to be essential to the growth of plants. This was the phlogiston—the essence of fire—which Priestley thought to be their proper food. De Saussure then asked himself the question: If a little is good, will a lot be better? He tested this question with plants growing in flasks filled with more concentrated carbon dioxide mixtures. Plants die, he found, in concentrations of over 50 percent; and even a small amount of excess CO_2 could be harmful to the plant in the absence of light which enables the plant to assimilate carbon dioxide and water to produce carbohydrates.

Germinating seeds, he found, absorbed oxygen and gave off carbon dioxide in their process of change and growth and, in the absence of oxygen, seeds will not germinate.

This process of respiration—the breathing in of carbon dioxide and out of oxygen, and its reverse—de Saussure was able to measure mainly in the leaves of mature plants. The roots, wood, petals and other non-green parts of the plant respire at a far slower rate. He also observed that the flowers in their process of development produce heat, and showed this to be dependent on the plant respiration.

Unlike many of his predecessors, de Saussure was unwilling to stop here and to conclude that air and water were the only nutrients needed by plants. Even though his experiments showed the mineral content of the plant to be very small as compared to the materials taken from air and water, de Saussure concluded correctly that they were essential to plant growth.

His painstaking analysis of the atmosphere which surrounded the leaves of the plant showed they did not absorb any of the nitrogen from the air, and he concluded

Figure for yourself how

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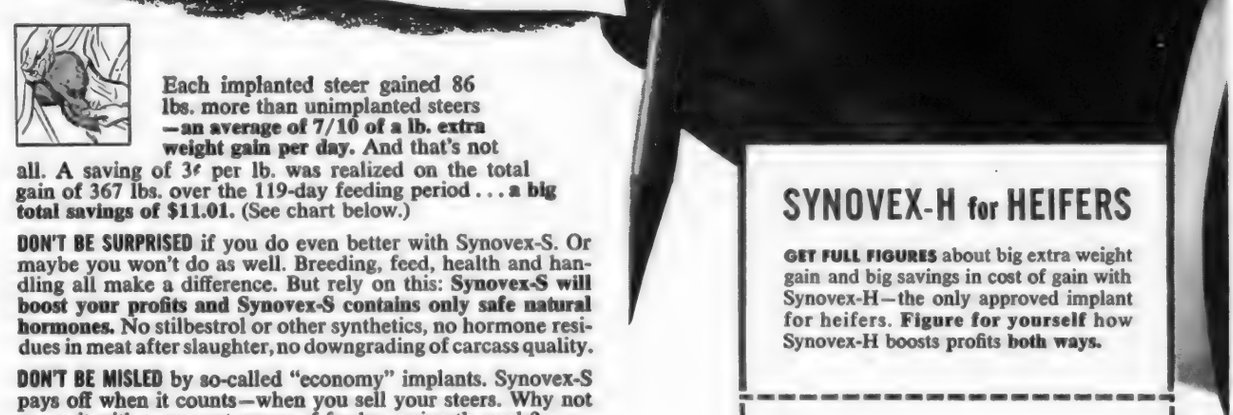
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Number of steers	234
Days on feed	119
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Total gain	367 lbs.
Saving/lb. of gain	3¢
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that all the nitrogen taken in by the plant was absorbed through the root. Further experiments led him to believe that the roots could take in this element only when it was fixed and in solution, though it remained for J. B. Boussingault years later to show the nature of these solutions.

Earlier writers, those who had believed that earth was the proper food for plants, had thought that the root was a highly selective organ able to take exactly those minerals from the soil which the plant needed for its growth. De Saussure showed that this was not the case, that the roots would absorb with the soil solution materials which were of no value to the plant, as well as some which were even poisonous to them. On the other hand, he proved that plants grown in the same fertile soil took from it different amounts of the essential elements. He also discovered that the mineral solution which the roots took from the soil was usually far more dilute than the solution in the surrounding soil.

He went on to attempt to show where the plants used the minerals which they absorb. This he did by burning the various parts of the plant and studying the ash. He found that the straw and woody parts of plants contain much higher percentages of silica, and that the seed contains greater percentages of the phosphate.

He also studied and recorded the mineral compositions of plants during their various stages of growth, showing, for example, that the total mineral content of herbaceous plants reaches its maximum before the flowering stage and thereafter begins to decline, due to the gradual dying of leaves and the leaching of the minerals by rain—as every farmer who wants to make the best possible hay must remember.

In 1804 de Saussure collected the results of his experiments into a book, *Recherches Chimiques sur la Vegetation,* which remains a classic of agricultural chemistry.

Though de Saussure led a very secluded life, he did serve a number of times as a conservative member of the Council of the Republic of Geneva. He continued to the end of his life to carry on his scientific work and to publish papers on plant chemistry which we have applied to agriculture.

He lived to see Justus von Liebig, Boussingault, and later scientists build on the foundations which he had laid.

Charles A. Browne, the American agricultural chemist, has said, "It was Lavoisier who chiefly helped to provide the foundation stones of modern agricultural chemistry, but it was Theodore de Saussure who put them in place. The fruitful results of the new chemistry are revealed nowhere more brilliantly than in his works."

In discussing his life work, de Saussure himself said, "The task which I have prescribed is doubtless hard and wearisome, but if one considers that the perfection of agriculture has been the object of my aim, he will bear with its difficulties and be tolerant of its shortcomings."

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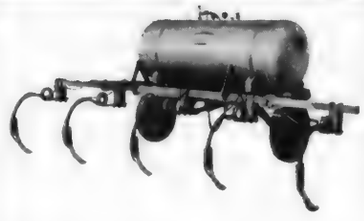

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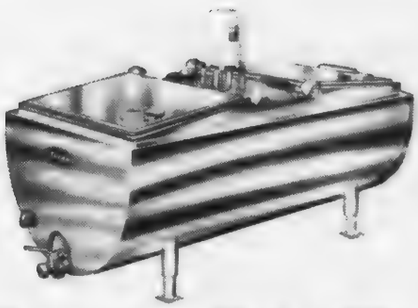

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And what a rugged machine it is! In a recent test, it performed the equivalent of 23 years of service – using over 6 miles of tape in single-space operation before the test was halted. No breakdowns. No worn parts.

Made in America, the Smith-Corona electric adding machine is fully designed as an electric – not just as a manual with electricity added. And it has all these features of larger, more expensive machines:

- **Up to 9-column capacity** to add, subtract, multiply and even divide!
- **Automatic addition and subtraction** with one-entry multiplication!
- **"Feather-touch" action** with cushioned keys . . . all control keys electrified!
- **Transparent tear-off bar** . . . plus extra-long, 9-foot detachable cord and "skid-proof" bottom!
- **Quick and quiet operation** at speeds of almost three cycles per second!

Smith-Corona adding machines are backed up by 50 years of know-how, plus the manufacturer's written guarantee. Service is available in over 300 Smith-Corona Marchant factory service locations and from over 4,000 dealers. See the complete Smith-Corona line at your dealer's. Or better still – mail the attached coupon for a free demonstration. No obligation, of course.

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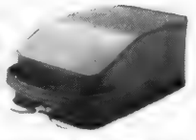

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MAIL-IN ELECTRONIC RECORDS

(*Continued from page* 93)

types of equipment are employed: key punches, sorters and tabulators. The key punch has a keyboard like a typewriter. However, its purpose is to punch slots or round holes in special cards. A punched card is the primary code-carrying unit. The standard cards are 7⅜ inches by 3¼ inches, and are of uniform thickness, stiffness and finish. Federal checks like income tax rebates, perforated and issued on similar cards, have made punch cards familiar to everyone. Cards have rows of columns, with more than 800 positions for holes. A special meaning or code significance is assigned each position. Once information is punched on a card it can be reused indefinitely, as purposes require. All subsequent processing of the cards is based on the punched holes. These holes are the means by which data can be converted into electrical impulses on other electronic equipment, a process called "reading." Three types of sorting are possible, sequencing, grouping or selecting. Sequencing arranges cards in numerical or alphabetical order. By grouping, like items are arranged together. Selecting is extracting special items from a larger file. Sorting speeds range from 450 cards to 2,000 cards per minute.

The Robots

Tabulators print the coded data from punched cards in understandable form. These machines print a report to a farmer showing, for example, his gas purchases for the year in order by dates, gallons and dollars. Changing the control panels produces a new set of data such as milk sales or fertilizer costs.

Larger machines compare sets of records from groups of farms to be used as a basis for research. These are the computers, which predict election results and solve space flight problems. They can't think, but they can render decisions, weighing many mathematical possibilities against each other. Adding, subtracting, multiplying and similar basic arithmetic problems can be done in one-millionth of a second. In a single second, several thousand simple arithmetic operations can be combined into a fantastically complicated problem and the answers may start issuing before the operator releases his hand from the starting switch. These larger computers must be housed in air-conditioned rooms. The temperature and humidity are kept under rigid control so that the sensitivity of the machines is not disturbed.

Farming by the Cards

Under Michigan procedure, monthly expense and income sheets are first given code numbers for each kind of item. Purchased feed is assigned the code number 10200. Lime purchases are coded as 10610, mixed fertilizer as 10510. Code numbers like these are put on the sheets to correspond with the items listed by the farmers. Then a card is code-punched for each transaction. All the cards for one month are then filed until the cards for three months have accumulated. When required, the cards are sorted for each farmer. Sorting continues by type of expense or income, then in order by months. Next the cards are run through a tabulator which adds totals and prints a detailed quarterly report for the farmer. An annual report is sent at the end of the year.

Mathematical computations for research studies involving large numbers of farm records are frequently run on the big computer at Michigan State University's computing center. This awesome electronic giant hums and clicks and eats up the facts fed into it, manipulates and reasons and spews forth rapid-fire answers that would take a roomful of clerks and mathematicians weeks to accomplish.

Trying to understand the internal operation of the big computers has exhausted many good minds. Most of the economists who use the equipment are content to let its mysteries stay undisclosed. One Michigan economist said, "The very capable young lady who arranges work for The Machine is known simply as Arlene. I am satisfied to let her have all contacts with It. I just give a bunch of farmer records to Arlene and she has them run through the machines and returns them to me in neat typewritten order, with all the mathematics and complexities worked out. I don't know how Arlene and The Machine

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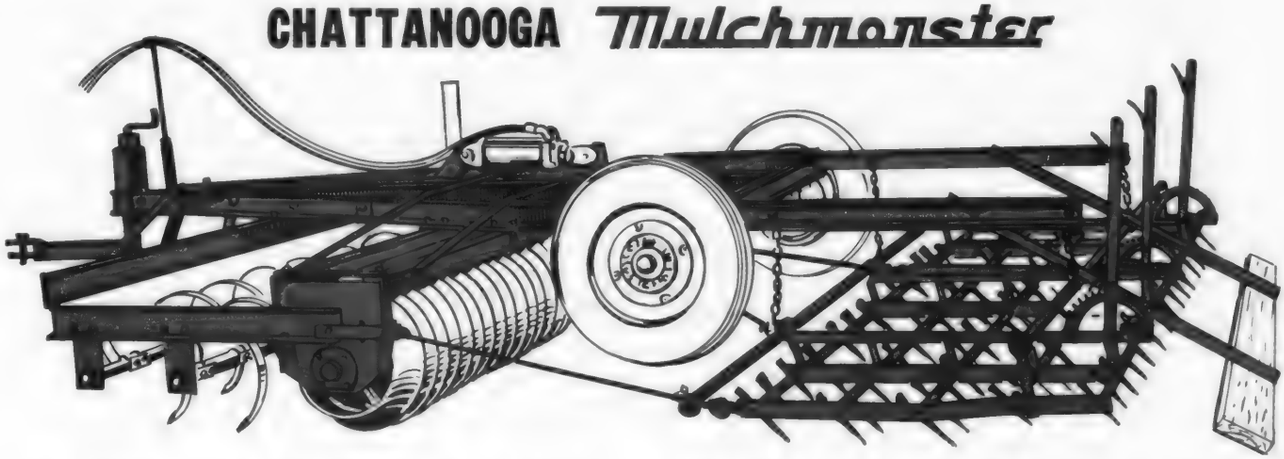

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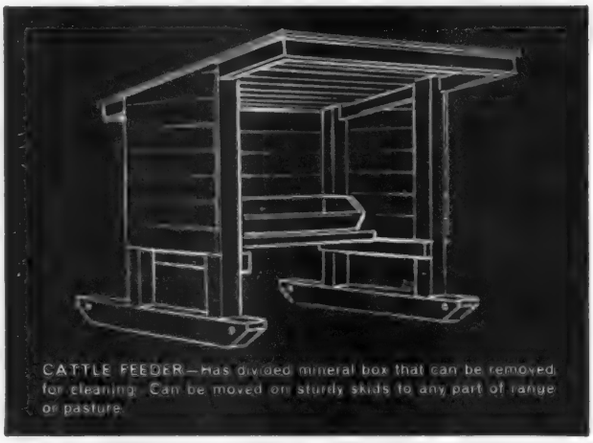

CATTLE FEEDER—Has divided mineral box that can be removed for cleaning. Can be moved on sturdy skids to any part of range or pasture.

These safe, simple and long-lasting mineral feeding stations were designed by Morton four years ago. Since then thousands have been built from these plans, distributed through Vo-Ag teachers and County Agents. Now you can get a complete set of plans for these easy-to-build salt and mineral feeders from your Morton T-M Salt Dealer—free for the asking!

And remember, when you fill these feeders with Morton Trace-Mineralized Salt, your animals stay healthier and gain faster. Feed Morton T-M Salt free choice—in bags or blocks. **Morton Salt Company, Chicago 6, Illinois.**

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HOG FEEDER—Wide roof overhang keeps minerals dry. Roof is hinged and braced for easy cleaning.

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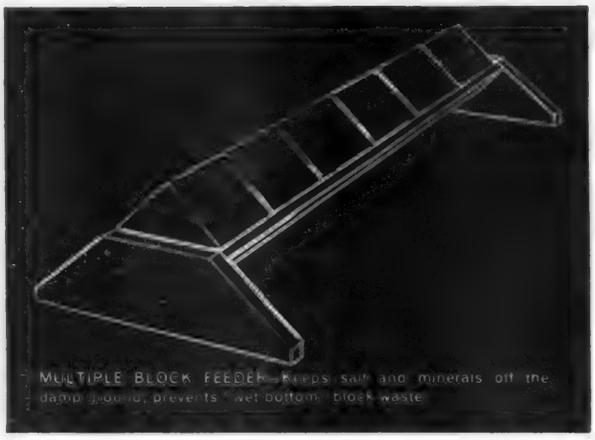
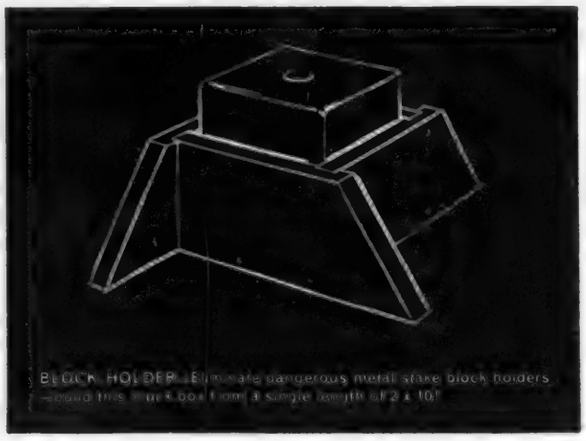


MULTIPLE BLOCK FEEDER—Keeps salt and minerals off the damp ground, prevents "wet-bottom" block waste.



BLOCK HOLDER—Eliminate dangerous metal stake block holders. Build this mineral box from a single length of 2 x 10!

manage it." A similar attitude is apparent at the University of Missouri. There, in the whirring, air-conditioned, impersonal atmosphere of the room housing the big computer, a sign hangs on the wall. It reads, "If you are not confused by now, you just don't understand the situation here."

New Advantages

The mail-in account program requires very little of a farmer's time. For spending an hour or two a month with records, he receives an understandable and fully detailed accounting of his year's business activities. There are numerous other advantages:

1. The records are clearly typed. They cannot become unreadable as handwriting often does. Several years' records can be easily filed, if desired, in the same binder being used currently.

2. Tax planning and reporting is made easy. The third quarter report comes back early in November. It shows total expenses and income through September. That gives six weeks in which to make adjustments like buying fertilizer ahead to save income taxes at the year's end. A yearly summary is returned to the farmer in mid-January. Totals spent for seed and other expenses, plus totals of income, as for wool or milk, or corn sold, need only be copied on the income tax forms. All computations have by then been done at the university.

3. Credit negotiation is simplified. Where loans are contemplated, a bank or credit institution can be given a detailed, accurate financial picture in a usable form.

4. Partners know each other's contribution. In father-and-son partnerships the capital investments each makes, the money each spends from day to day, and all other transactions, including the returns for labor, are down in black and white. Landlord and tenant investments are similarly shown, with each getting a copy of the overall report. Landlords have a new tool with which to judge a tenant's efficiency.

5. Annual reports provide a business analysis. Each farm is compared with others in the area by kinds of income and expense. The leaks show up. A farmer can see if he is spending too little for fertilizer compared to farms of similar size. He can readily see if he has too much machinery for the size of his operation or if his percentage of tillable pastureland is excessive. Along with the year-end report, strong and weak points of his farm business are pointed out in a summary submitted by extension economists.

6. Major changes and long-term investments can be justified and soundly amortized. The way is open to management adjustments that farmers can make to reach a better balance between costs and income. (A 10 percent greater efficiency in annual farm costs can mean a 40 percent increase in net earnings with no increase in consumer prices.) Wiser decisions can be made. Reports for the preceding year come in time to permit planning for the season ahead.

Perhaps no one has a deeper conviction of the value to farmers of Michigan's mail-

If you grow any of these crops...
you need a
HAHN HI-BOY®
Hi-Speed Sprayer

only equipment that effectively works tall crops!

CORN

Get into your fields at any crop height and under wet ground conditions that stop other equipment. Fight corn borers. Control weeds through lay-by time. Side dress with liquid nitrogen late in the season.

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Follow the complete Hahn Hi-Boy fertilizer, insect, and weed control program, pre-emergence to harvest, for highest yields. Get through even rankest cotton without damaging crop. Only equipment for effective bottom or partial defoliation and complete defoliation.

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Rustproof aluminized steel tanks and booms. Applies 32% liquid nitrogen solutions and complete fertilizers to as many as 300 acres per day. Wide-angle nozzles and high speed permit top dress application on small grains at heavier rates with less burn.

Side dress with liquid nitrogen

when corn is 4 to 5 feet high to boost yields 15-20 bu. per acre. Hahn Hi-Boy is the only equipment that can do the job right. Gets through tall corn at high speed.

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Says: Ed Greenway
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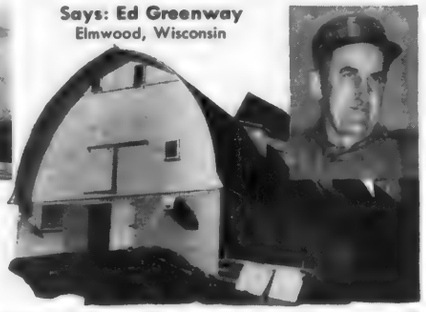

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in account program than L. H. Brown, extension specialist in economics. "Hi" Brown, as he is known to many Michigan farmers, has worked with the project since its inception. He has said, "This is not cost accounting. The latter requires endless records that farmers are unwilling to keep, like the exact number of hours spent at each task. Cost accounting is far too expensive a procedure for most farms. So is linear programing, the new method of farm planning that weighs many combinations of possibilities with many others, by electronic computers, to determine which will give the greatest profit on a farm. I am convinced that the farm reports we, or anyone else, can return to a farmer are not really significant unless we take the time to get acquainted with the farmer's problems at first hand. Figures are not enough.

The Man and the Machine

"No electronic computer can measure a man's heart or his management ability. Machines don't have judgment. A good farm manager, like a good farmer, is somewhat of an artist. He is nudged by his feeling as to what will or what won't work. On an occasional farm visit an extension agent or a management field man gets to know a man and his farm, too.

"How a farmer manages his cow herd might not be as important as how he manages his debts. We get to know about a farmer's sprained back, about his psychological makeup, his aims. These things we must know to assess the man and to be of help in planning his future as a farmer. In any farm planning, a man's goals are of first importance. Figures aren't enough. Maybe he doesn't want to make a lot of money. Maybe he just wants a nice farm, but he will have to increase his income to realize it.

"Profits aren't the only aims people have," Brown said. "A man might want a swimming pool, or a college education for his children, or he might like to own the 40 acres of land adjoining his own. You can't easily put such goals into their dollar value. A man's goals often change. A barn burns, a tenant leaves, or a son comes home from the army. Suddenly, perhaps a new silo is considered justified, though for years it was considered out of reach."

It took such an incentive to change the thinking of the Zeeb Brothers of Bath, Michigan. In 1955 they had 29 cows, with 238 tillable acres. Along with the cows, some cash crops were grown. Ronald Zeeb, his brother Bernard, and a full-time hired man were the labor force. Then Robert, Bernard's son, got out of the army in 1956 and wanted to farm. The brothers decided to make him a partner. They had been members of the mail-in record system since its inception. A higher net income was necessary. The records indicated the direction to take. Working with Earl Haas, the county agent, and Hi Brown, a long-term expansion was planned.

Changes included a new pole barn and silo built in 1957, a 30 by 90-foot hay barn built in 1958, a milking parlor and the addition of 120 acres in 1959. By 1960, the herd was up to 60 cows. During 1961, a 24 by 50-foot silo was built and they have increased their herd to 73 milkers; by 1963 this will be pushed to around 100 cows. Over the expansion period the additional investment will reach $100,000. "It was a plunge, all right," Bernard Zeeb agrees. "From our records it looked like a sound investment, but it took a lot of planning to adjust our finances. Our farm records and some planning help from Earl Haas and Hi Brown have been invaluable to us in making this change."

Sometimes a single weakness, brought into focus, becomes the path to a whole network of changes. William J. Boettcher, who has a 90-cow beef herd near Bland, Missouri, readily saw the advantages of having his farm compared, item by item, with other farm enterprises in his state. He said, "We found we were overequipped. Our records showed it. We have over $17,000 in machinery. The overall state average is about $6,000, with beef farms having less machinery than that. Our machine costs per acre are about 25 percent above average. Rather than cut down on tools, we decided to increase our volume, to expand to the point where our machinery could pay off in more hours of use. That means more cattle, but it takes time to increase a herd. Eventually our income should increase, too. We aren't just farming from year to year. We are farming for the long pull."

No BABY SITTER NEEDED!

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WITH *new*

AUTOMATIC MOISTURE CONTROL

*Optional Equipment

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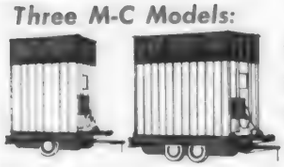

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Model 300—For average farm. Dries and cools up to 160 bushels per hour.

Model 400 — For larger farm. Dries and cools up to 210 bushels per hour.

Model 600—High capacity unit. Dries and cools up to 330 bushels per hour.

All dryers equipped with holding bins and/or automatic leveling augers for wet grain. Either tractor PTO or electric drive. LP Gas fuel.

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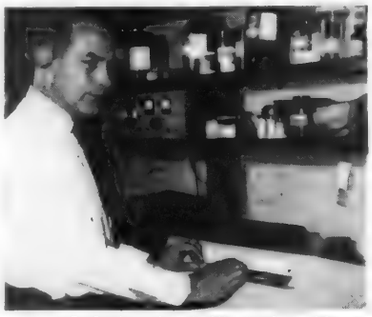
People and Pesticides

Searching for a needle in a haystack is more than just a saying to Jack R. Graham. It is, in a sense, his job. As leader of the residue analysis group at Niagara's Middleport, N. Y., research laboratories, he and his staff of five determine residues on crops after they've been treated with pesticides. "We're always working in the realm of parts-per-million," he explains. "It's like trying to find one pound of pesticide in a million pounds of apples."

Jack directs the lab workers in his section, and—with Dr. Carl Holsing, his immediate superior and head of the analytical and formulation department—writes up the data obtained for submission to government agencies. To register new pesticides, or renew registrations for pesticides already in use, performance and toxicity information must be included with the residue results. Together, these facts are sent in as a petition for a tolerance.

During the growing season, Jack supervises the collection of crops from the field and the extraction of pesticides from these crops for residue analyses. In some instances, the crops are whole-frozen and the residue work done after the "rush" is over.



Jack R. Graham heads Niagara's residue analysis group at Middleport, N. Y.

From time to time, Jack's work takes him traveling. He makes a point of attending meetings and visiting experiment station personnel working in the same field. And, when necessary, gets together with state and federal scientists running analyses on Niagara products. However, most of his six to twelve trips a year are confined to the Eastern and Midwestern States, since Niagara has a similar residue analysis set-up on the west coast.

What does he like most about his job? "Actually seeing new Niagara chemicals reach the point where they are of service to agriculture." He was involved in residue studies on Tedion® miticide and Thiodan® insecticide in their early stages. He's particularly proud of having developed a laboratory technique for determining residues of ethion miticide-insecticide in the presence of other phosphate insecticides.

Jack, like many Niagara agriculture specialists, has practical farming experience. He grew up on a North Carolina poultry farm and belonged to both 4-H and FFA. His dad raised wheat and cotton, as well as poultry.

College training came after World War II. He spent two and a half years in the Army, served as a paratrooper in Germany. In 1950 he got a B.S. in chemistry from the University of North Carolina; two years later, an M.S. in organic chemistry from the same institution.

Jack joined FMC's Westvaco Division (now Chlor-Alkali Division) in 1952. He was hired to prepare chemicals for fungicide screening at Niagara Division, which involved getting the idea for a chemical compound, then isolating and purifying it. He transferred to Niagara Chemical Division at Middleport in 1954.

Home for the Grahams is Medina, N. Y. Jack and his wife Betty, who also comes from North Carolina, have three young children. When asked, Jack says he'd be glad to see his two boys become farmers "if they were good ones," or chemists "if they want to be." He likes to spend his spare time bowling, reading or on the golf course. On "Career Day," he talks to students at the local high school about new developments in chemistry.

Jack considers "finding minute quantities of pesticides in voluminous amounts of crop material" the toughest aspect of his job.

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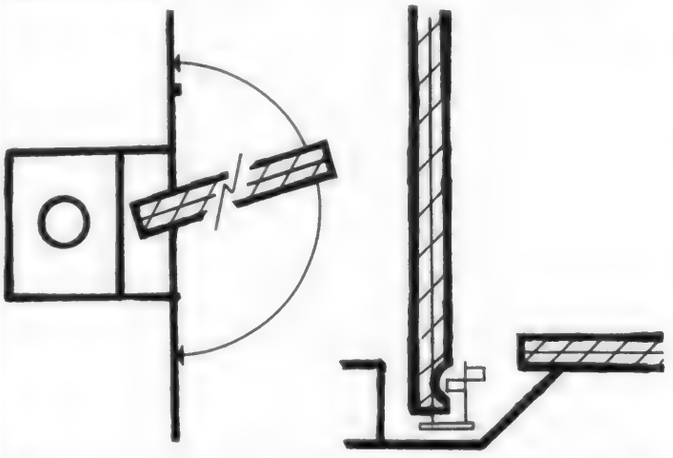
LOW COST GRAIN HANDLING

(*Continued from page* 80)

hang from it. A horizontal auger to the top of each bin would pass through open air. Second, the roof protects them almost entirely from the weather; and third, the system cuts down the height of the center pole building by about 17 feet. The building housing a bucket elevator is 35 feet to the peak; Siebrase's center structure is 18 feet to the peak.

The reduction in height in the pole barn, together with a slightly smaller overall size, resulted in a $660 saving for the Siebrase building over the one housing a bucket elevator. Siebrase's cost $1,900, the other $2,560. Savings in the building, savings in the elevator, smaller motors and augers, and by avoiding a large pit, amount to $2,500 to $3,000. Annual savings in depreciation, interest, repairs, taxes and insurance run $350 to $400.

In the Siebrase layout, the same motor and auger conveyor fit each bin. A tube stays in the bin floor into which the auger slides. This underfloor bin auger feeds another auger running under the concrete driveway into the pit which is the pickup hopper for the elevator. However, the auger crossing the driveway does not handle grain dumped on the floor. A specially designed sweep auger rotates in a half circle centered on the elevator pit. The sweep pulls the grain from the floor into the pit. The pit is protected by two-by-fours laid on edge about two inches apart. The sweep auger automatically switches itself off when it has completed one pass.



The sweep auger, viewed from above (left) eats into a pile of corn and pulls it to the pit, where the vertical auger elevates it to bins. The side view, (right) shows how the sweep auger lies on the surface of the concrete floor. (The motor and drive are omitted for simplicity in the drawing.) The auger is not housed in a casing. The paddles which force-feed the vertical auger are also shown.

"It's the damnedest thing I ever saw," said one visitor. "You can pull through the drive, dump the grain, turn on the sweep and leave. The whole system cuts off when the sweep is done, and there's only about a one-inch layer of grain left on the floor."

The little auger moves forward under its own rotation, gripping with a small wheel at the outside end. A crescent-shaped shield behind the auger helps the cleanup. Without the shield it leaves slightly more grain.

"It should be possible to design a rotating brush, following the auger, to clean up the grain completely," said McKenzie. "But it's all a matter of the expense. When you start getting this sweep auger too complicated, you find it probably pays to put the money into picking up grain another way." Siebrase, though, has considered another way. He contended it would be possible to use gravity flow wagons, with a side opening, to discharge right into the floor hopper.

Last year Siebrase found the device picked up some dirt and stones from the driveway. "Sure, we've got a magnet in the mill, but it won't take out limestone," he said.

McKenzie argues that if, on four or five of the days Siebrase picks corn, ground conditions are such that wheels carry debris, and Siebrase has to sweep the floor between dumps then "that's

because I'm saving him money. I don't believe in dollars and cents he can afford to replace the broom."

That started the exchange of ideas as McKenzie and Siebrase, both puffing intermittently on their pipes as the other spoke, discussed the choice of equipment and techniques in the storage facility. They began with the floor sweep, but the theory of its use took them to broader concepts: "I've learned two things about the floor sweep," Siebrase said. "First, it needs to be longer, as it misses part of the grain at the far side; and second, it needs a variable speed pulley so I can change rpm and prevent overfeeding the vertical auger. When that plugs, grain backs up in the pit at the bottom of the vertical auger."

"McKenzie countered with: "We knew it had to be longer, Wilbur, but this was the only shielded auger we had. But why not use a feed switch in the pit instead of a variable speed pulley? The switch could be wired to cut off the floor sweep when the pit was full, and hold it off till the elevator caught up."

Siebrase thought for a while, not answering the new idea directly. Then he continued, "Another thing about this vertical auger. We bought the regular weight helicoid, and it's just not heavy enough. I found we sure needed the commercial helicoid. That's optional and costs a little more. It's worth all of the difference. I wish I'd got it to begin with. It has keys in the pulleys instead of setscrews, and stronger shearpins. It's stronger and heavier, and we haven't had a stoppage since I put it in. It's no fun making repairs to that vertical auger. You have to juggle it down between the hoppers until you can get the helicoid out of the casing to replace the shearpins."

McKenzie was still thinking about the feed switch, listening carefully to Siebrase, but reluctant to leave his own idea incomplete. "The underfloor conveyor, when it brings grain from the bins, must be regulated so it doesn't overfeed the vertical screw, either. So it'd be a good idea to have the same feed switch control either the cross auger or the sweep auger. We'll put the feeler arm at one side of the pit where the grain isn't moving so quickly, and then the augers won't cycle on and off too much. Using one switch for both augers will save us a little, and there's not much changing from one auger to the other."

Money Matters

McKenzie paused, and passed into economics, explaining the whole concept of the layout with one small part, a feed switch. "Remember, you've got to charge the cost of this feed switch to the method of unloading. It's the same as using the broom to keep dirt off the driveway when you're dumping corn. If you need to pour 20 feet of concrete outside the building that you don't need for anything except to keep dirt out of the unloader, then you must charge it to the sweep unloader, and it might turn out cheaper to use some other type of unloading, like a floor pit you can cover."

The two men were agreeing now, pointing with their pipestems and talking faster. "Yes, it's like the vertical auger," said Siebrase. "You'll have difficulty proving to me that I need a bigger elevator."

McKenzie nodded agreement. "There'll be ten times a year," he said, "you could use a bigger auger, and those are the ten mornings when you unload the thousand bushels of dry corn from the drying bin. That's going to take three or four hours. But my question is, if you're only going to be slowed up ten times a year can you afford $500 extra for the bigger equipment?"

Siebrase concurred. "That's right, because that vertical auger works as fast as the grinder for all the feeding operations the rest of the time. It'll handle 275 bushels of 16 percent corn an hour. And I use a bigger auger to unload the feed mixer."

Siebrase started out on a different tack, still discussing choices for initial equipment. "We didn't put a plenum under the second bin, so we could add a false floor later. I wanted to, but Noah couldn't see it. If I had a drying floor under both bins we could be drying one bin while we were handling grain out of the other. There'd be no problem switching the heater and the fan over. We could build a plenum ring with a switch in it."

Here McKenzie countered, "But then you're buying a drying floor to make up for the slow handling capacity of the elevator, not

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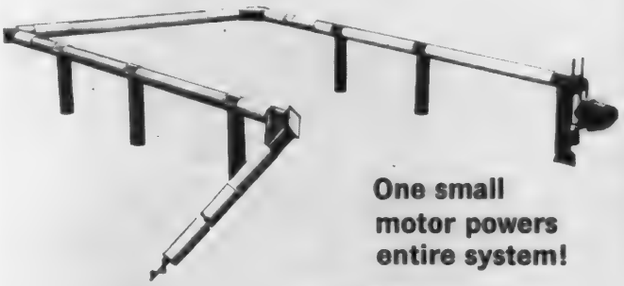

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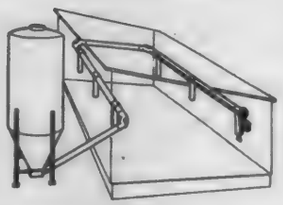

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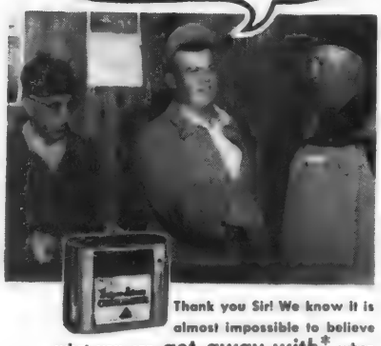

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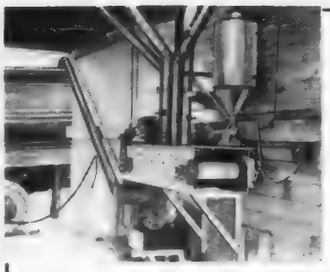

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Second Thoughts

Siebrase likes the layout, would change only two things. He believes the center building should be two feet wider. It is now 20 by 26. The width is made up of a 12-foot drive and eight-foot offset to house the elevator, hoppers, batch mixer and burr mill. Siebrase feels with two more feet of offset he could maneuver his weigh buggy a little more easily. This weigh buggy is a portable hopper on scales. His second complaint is that, to begin with, he put no drain in the pit below the vertical auger. It accumulated water, which he had to bucket out. The tile is now installed. "The trouble with a tile in this flat land is that you have to run it to the next county to get enough drop in it. But it's working fine."

The total plan includes four storage bins. Siebrase has two, both on one side of the pole barn, the minimum for a complete drying and handling unit. He and his landlord plan to complete the setup during the next two or three years to get a total of 15,000 bushels of storage. The two existing bins hold 2,2000 each, and about 10,000 bushels of corn stored in existing ear corn storage is run through the new facility.

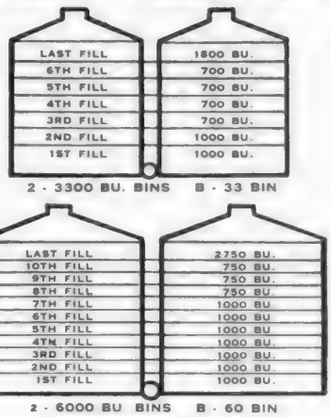
The Feeding System

Siebrase batch-mixes his hog feed, grinding his corn through a John Deere pto-driven burr mill, which feeds directly into the batch mixer. The mixer is a 1½-ton double auger mixer made by the Prater Pulverizer Co. of Chicago. Siebrase bought it used, for $130 and equipped it with a 5-hp motor and controls for approximately $210 more.

He adds supplements to the mixer in a homemade weigh buggy. "It's cost me less than $20," he said, "and you couldn't buy a new one like it for less than $300."

To unload the mixer into the auger wagon which takes feed to the hoglots, McKenzie and Siebrase designed a suspended auger, a six-inch auger with a one-hp motor. It hangs on chains from the roof of the barn so it can swing into position under the mixer and yet can be moved out of the way when a large truck comes through the driveway. Experience showed a heavy-gauge chain is needed to support this auger when full of feed — one side of the first double chain broke. "I thought the whole lot was coming down," chuckled Siebrase, "and it nearly did. Now, as you see, I'm using much heavier chain, still double; that ought to hold it."

LONG TWINS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2ND FILL 1000 BU.
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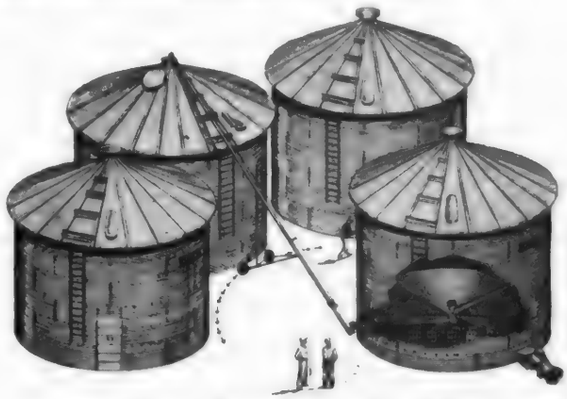

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Only the Elements

Some different wrinkles, and a step by step approach were used in the same basic McKenzie layout on another Indiana farm. Here, in Maywood, near Indianapolis, the Lugar Stock Farm is operated by Monty Sink, a tall, young farmer who operates a busy 600-acre corn and hog farm. His landlords are two brothers, Richard and Tom Lugar, of Indianapolis, who, with Wilbur Whitehead, of Duff Farm Management in Lebanon, encouraged this new setup. "We had to break out from current production levels to have a profitable farm so close to Indianapolis, with residential expansion and general uneconomic farming around us," said Richard Lugar. His facility is being built in stages, to spread out the investment till time and funds are available. The solution? Leave out the center building! At first glance, the result of the first year's construction looks crazy—two large bins more than 24 feet apart, and in the middle a telephone pole on which hangs a green auger at a drunken angle, the motor high in the air. But this is a beautiful example of using money well. Sink needed storage, drying facilities and mixing equipment, but he needed storage and drying most, so they came first.

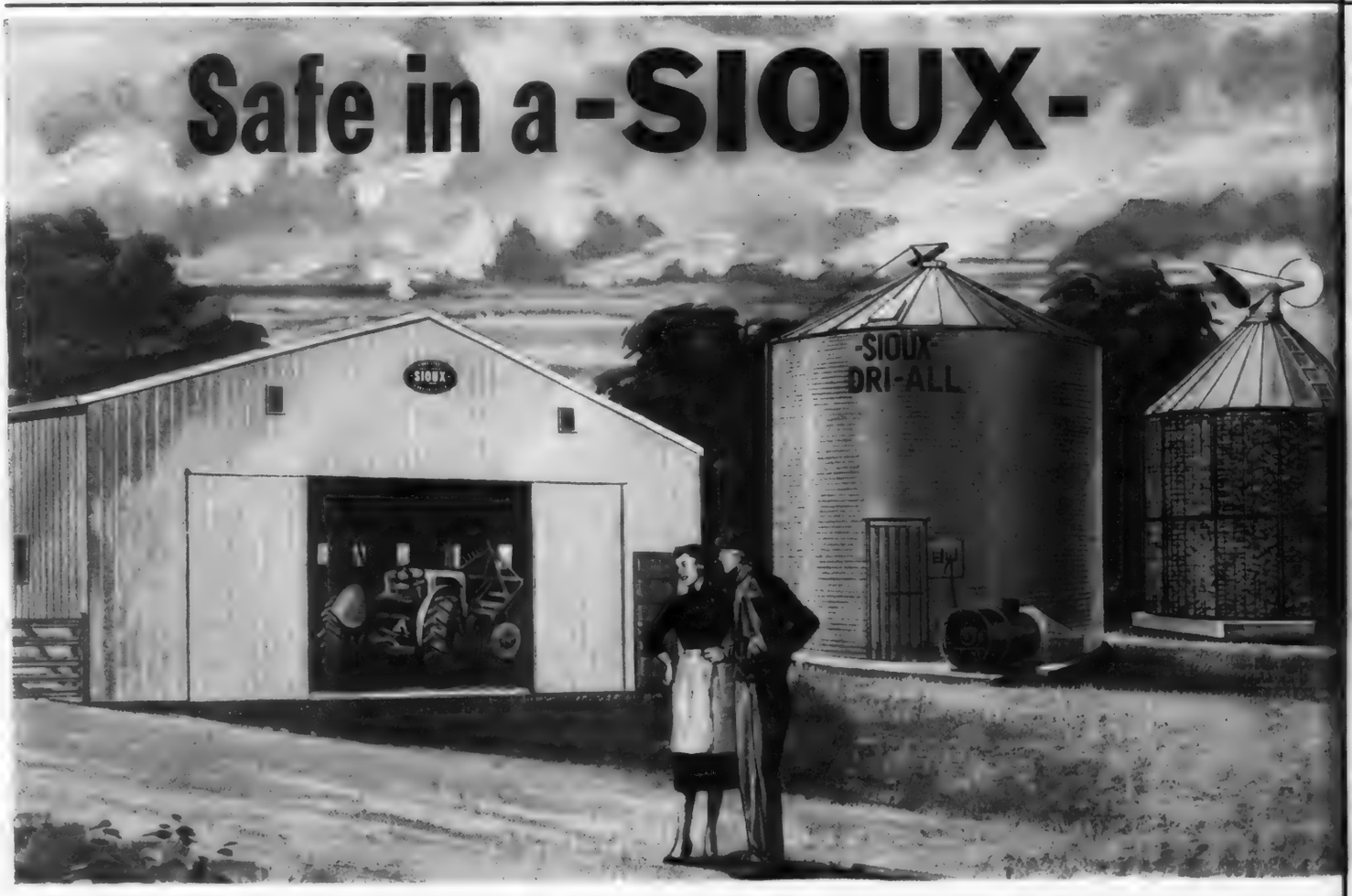
The essentials are there, and only the essentials—the two bins, 4,300 bushels and 7,200 bushels, are separated so the pole barn can sit between them, and the vertical auger is offset to leave space for the drive-through. The dryer is on the smaller bin. The auger sits in a wood-lined pit (to be replaced by concrete), into which grain is dumped from an auger wagon. The problem was, to reach from the top of the vertical auger to the hoppers on the augers which run up under the roofs of the bins. As there was no center building to support pipes or augers, McKenzie's answer was to tilt the vertical auger until a simple spout could reach the bin auger hopper. The 20-foot vertical auger is mounted on a device like an oarlock—made by Sink himself. The auger can turn or tilt—and is controlled by a rope through a pulley at the top of a pole the same height as the auger. When the center building is added, the vertical auger will tilt just as it does now, though the support will be from the building, not a lone pole.

The force-fed six-inch auger is made by West Fargo Mfg. Co., West Fargo, North Dakota. It is a high-quality, heavy-duty unit, with force feeding by an seven-inch section at the bottom.

The oarlock was made by welding two supports to the auger housing, joining them into a U-shape on a bar which was hinged, and mounted on a pin to allow swiveling.

"One of the problems," said Sink, "was to locate the augers in the bin walls at the right place so the vertical auger would tilt easily to them. When the bin well was built you couldn't see the cap of the bin from the

(*Continued on page* 167)



MANAGEMENT TO CONTROL WORMS

(*Continued from page* 59)

spots. They ingest more larvae from grazing so close to the ground on the short pastures. More eggs are expelled and the animals continue to reinfest each other. The mediocre diet of the overgrazed fields soon ceases to supply an adequate nutritional level. Young, growing or pregnant stock and young, lactating animals are first to be hit by the double-barreled destruction.

Meanwhile, symptoms of parasitism appear. Often the symptoms of malnutrition and worm infestation are hard to distinguish. Again, the symptoms of internal parasites suggest other diseases. Loss of flesh, weakness, anemia, paleness of membranes, swelling such as in "bottle jaw," lack of appetite and diarrhea or constipation develop.

The picture inside the animal is one of physical havoc. Some of the worms are bloodsuckers which destroy the red blood cells and may cause numerous tiny internal hemorrhages. Others bring about nodules or "knotty guts" or patches of erosion in the stomach or disgestive tracts. The inflamed, irritated viscera's natural action is speeded up, increased water is drawn from the tissues (dehydration) and diarrhea results, with little absorption of the food which is taken in. Often the stomach becomes ulcerated, the digestive process painful, and the animal refuses to eat. Deaths from parasitism can be numerous.

Management is the Key

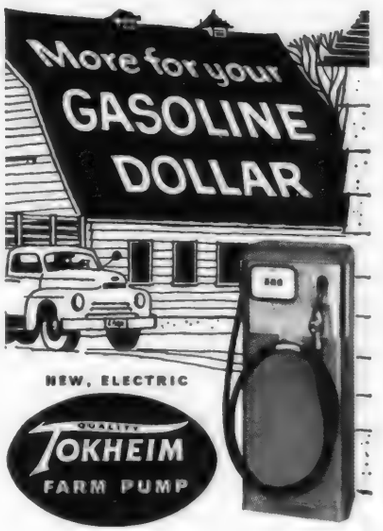
Though worms seem here to stay, the surprising fact also remains that worm control is simple, inexpensive and highly rewarding. Medication of sick animals is not the answer. Don't double up on cures; instead, double up on prevention. It is my firm belief that stockmen must accept a three-phase view of the situation.

First, consider worms as chronic with cattle or sheep and goats. Complete eradication is impossible with present knowledge. So learn to live with them. Don't, however, shrug them off as unimportant, or necessary evils.

Second, don't single out one or two unthrifty animals for treatment at the neglect of the others. When one animal shows evidence of parasitic disease you already have a herd problem. Control, to be effective, must cover every animal, and sanitation must be farm-wide and complete.

Third, start a long range program to keep worms in check, before they show up as symptoms. The job will never stop. Don't be misled into believing a one-shot treatment will cut out the worm problem any more than one dusting will rid cotton of boll weevils forever.

You need not be able to recognize one worm from another. Nor do you need any great knowledge of symptoms or chemical treatments or animal physiology. All you



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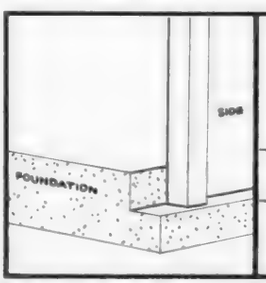

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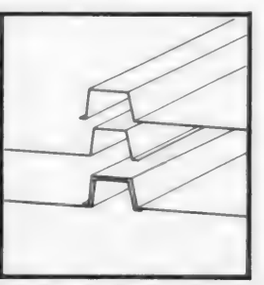

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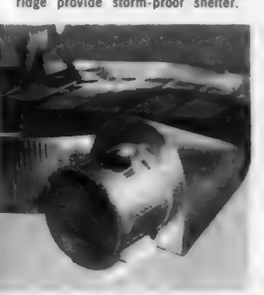

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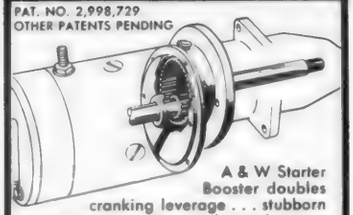

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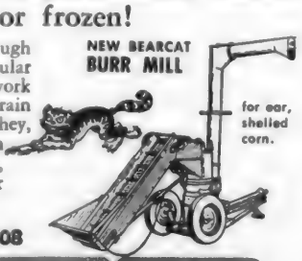

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need to bear in mind are two sure-fire, good sense rules.

1. Feed your livestock well.
2. Break the worm cycle.

These go hand in hand. A well nourished animal is more capable of combating a worm attack. Conversely, whether a sick animal suffers from malnutrition or worms, the treatment is the same. The best medicine you can give a wormy, unthrifty animal is more and better feed. Let me reword and repeat that: Good nutrition is the best worm medication.

My viewpoint will be challenged, I know. Animals severely infected with hookworm, for example, might die though abundant protein is available to them. When the stomach or intestinal lining becomes so worm damaged that digestion is painful and food is refused, protein is, of course, useless. But until that extreme, good nutrition is essential in combating worms.

Internal parasites are primarily connected with the grazing season in areas where annual rainfall exceeds 30 inches. Parasites develop best at air temperatures between 65 and 85 degrees Fahrenheit. Below 65 degrees, egg hatching is slow; above 85 degrees larvae develop poorly. In the Northern states, winter temperatures kill large numbers of the expelled worm larvae, providing something of a natural break in the worm cycle. In our Southern states grazing may continue all winter, often to the detriment of pastures and livestock alike, with the worm problem intensified. Time and time again I have been confronted with wormy livestock and have given but one prescription: Plenty of protein and a change of pasture. It never fails to work. In our Texas research, at times we inoculate calves with worms for study. We had one man doing the feeding who used to love to throw the protein to them. The calves would improve to the point where they'd lose great numbers of the worms we were trying to cultivate.

Most farmers easily recognize undernourished animals when feeding in drylot or barn. A closer watch is kept on condition and appetites. The number of pounds of roughage or grain or supplement to feed at such times is readily found in standard tables. Nutrition is more apt to be inadequate during the grazing season, when worms also thrive. It is not easy to measure the value of forage, but it must be done.

Young, fast growing grasses and legumes offer the highest protein content in forages. Yet, in early spring, the grass may be so "mushy" that a few pounds of dry hay or a half to one pound of protein like cottonseed cake should be fed in addition. As pasture becomes tall and woody, clipping is advisable to quicken growth and restore protein content. Regardless of the worm situation, a change of pasture is desirable, from the point of view of both livestock and herbage, whenever it has been worn down. The best system is to use all the available livestock to graze a restricted area rapidly and to move them to ungrazed areas every

"I shoot for $30,000 profit a year from 500 head"

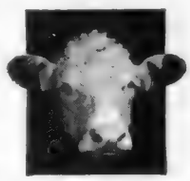
"And Stilbosol accounts for $3,000 of that profit," reported veteran cattle feeder Harry Marks, Delavan, Minnesota

"We try to run 500 head of cattle through our yards every year and I feed for a gross margin of $60 a head. Of that profit, I figure Stilbosol accounts for at least 10%.

"We're feeding heifers now. You can buy 'em cheaper and they sell for only a little less than steers. We feed our heifers to around 950 pounds. With Stilbosol, our heifers have gained an average of two pounds per day, and that's from western weight to market weight. That includes about 5% shrinkage at both ends. It usually takes about two weeks before they recover and eat right.

"One year we fed some steer calves on silage without stilbestrol in our ration and they gained an average of 1.45 pounds per day. The next year, we fed 'haylage' and stilbestrol to our steer calves and they gained an average of 1.95 pounds per day. We weigh cattle every three months on our place so we know our gains.

"My pride and joy is our new feedlot. We call it 'Cattle Castle.' My 12-year-old boy, John, is going to be responsible for the feeding. He'll feed 200 head of cattle three times a day for a total of 34 minutes. All he has to do is flip five switches. I put a window in the control house, because half the fun in feeding cattle is to see 'em eat," Harry concluded.



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few weeks, with plots alternated between grazing and resting. When little succulent herbage remains, try a little dry feed to gauge the animal appetites. The cost of supplementary feeding will be far less than the loss of profits through malnutrition or disease.

Dr. W. T. Berry, in charge of the 1,000-head Santa Gertrudis herd of Winthrop Rockefeller's Winrock farm in Arkansas, has said, "When cattle are turned on pasture, don't just forget them. If the grass becomes inadequate and spare pasture is not available, start supplemental feeding before the need is too great. Don't put it off. If you don't know how to supplement poor grazing or cannot recognize the poor nutritional value in a seemingly fine-appearing pasture, you'd better get better acquainted with your job."

Bankers often advise cattle feeders to buy their cattle for cheap gains; to buy thin cattle. But the man who follows this advice may be buying a lot of worms. If you are in a highly infectious area and are going to pasture bought cattle, you'd better stay with native stock, since they are more resistant to local parasites. If the cattle are to be fed in drylot, it doesn't matter.

You can break the worm cycle in several ways. Change of pasture is one way. Attention to weather, to sanitation and to drainage is also important and medication is an important aid. In my opinion, good management comes first.

Sanitation details need attention. Look for and eliminate contamination. Heavy droppings should not be allowed to accumulate near watering holes. Portable shades and pasture feedbunks should be moved frequently to help spread droppings.

Dry feed should never be fed on the ground, for worm larvae can readily be licked up with it. Low, wet pastures are pest spots. Irrigated pastures, too, are favorable for larval development. The temptation is to overcrowd when irrigation is begun. Such fields should be divided with temporary or electric fences, and plots rotated at 30-day intervals. Where any pastures have been closely and continuously grazed, or are known to be a source of heavy infestation, resting periods should be extended to 60 or, if possible, 90 days. Dryness, sunlight and exposure kill the larvae. Few survive beyond 90 days. Those that persist stay within a few inches of the ground. Where pastures are permitted to grow substantially, stock, especially cattle, are inclined to chew off the grass above the larvae. When all the grass is short, every mouthful is potentially dangerous.

Research is giving us more and better chemical control measures as time goes on. Remember that drugs poisonous to worms are to a degree poisonous to livestock as well. So very weak animals need nourishment, preferably in drylot, rather than treatment with chemicals. Do not use mineral mixes for parasite medication. They have no effect on worms.

Offhand dosage with random nostrums is a good way to get into trouble. Worm treatments, if advised by your veterinarian, should be given at least under his direction and only after careful diagnosis. Fecal counts (of worm eggs in manure) are fair indicators of parasitism. It is advisable to have herd fecal counts made several times a year where parasites are a serious regional problem. Such tests from small manure samples can be made by a veterinarian at a cost of about two dollars. Some veterinarians make the tests free, as part of their services. Blood cell counts for anemia help show the extent of damage and can be made in any veterinary laboratory.

Chemicals for worm treatment work in different ways. The primary purpose of most of them is to break the worm cycle. The newest of these, the organic phosphate systemics, may be given orally or are sprayed on the animal at very low (0.25 to 0.50 percent) strength. The drug kills surface parasites such as lice and ticks and is absorbed into the bloodstream, making the animal poisonous to internal parasites such as cattle grubs. Though systemics are not yet recommended for many of the parasitic worms, there is evidence that they do help control them and testing is being done along this line. Systemics may not be used on milk cows, or on meat animals within 60 days of slaughter. They should not be used on young animals. Organic phosphate systemics are available under these names: Co-Ral, Korlan, Trolene, Ruelene and ET-57. Some may soon be available as feed additives.

A vermicide kills adult worms inside the animal, a vermifuge causes the adult worms to lose their grip on the stomach or intes-

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tinal wall and to be passed in the manure. Older treatments employ one or the other of those methods. Phenothiazine, also a vermicide, works somewhat differently. Inside the animal it tends to inhibit egg production; outside, its presence in the manure prevents many of the eggs from hatching. Low level dosage with phenothiazine has gained widespread favor among sheepmen. Phenothiazine powder is mixed with loose salt (1 part phenothiazine to 9 parts of salt by weight) as a free choice mix. The method gives good worm control in both sheep and goats, especially if supplemented with phenothiazine drenches (at rates recommended with the product) during the pasture season.

Many veterinarians advise a similar low level feeding of a phenothiazine-salt mixture for cattle. My experience leads me to believe that cattle cannot be made to eat enough of the phenothiazine to be benefited. Furthermore, phenothiazine as a cattle drench or in dry dosage has very little effect on the cattle worms most commonly found in southern regions. The experiences of other specialists bear me out. Dr. Marvin Koger, animal husbandman of the University of Florida, has stated, "Phenothiazine is used throughout the state of Florida. In a 4-year test on well managed improved pastures, however, phenothiazine treatment failed to show any beneficial effects on death loss or weight gains in cattle of any age and the treated cattle harbored just as many worms upon slaughter as the untreated controls. The results indicate that the usefulness of phenothiazine for parasite control in cattle has been greatly overrated." Worms which are more common to other areas might be more affected by phenothiazine.

There is also the possibility that phenothiazine may act like antibiotics in human medicine, that is, it may work in some cases and fail completely in others. Already some strains of worms are developing resistance to it. Phenothiazine causes temporary reddening of the urine. That fact should neither cause alarm nor give rise to the belief that "it must be good since it acts so quickly."

Thiabendazole, a new roundworm chemical under test, though not yet on the market, promises to be very efficient especially with worms in sheep. Thiabendazole is considered much more potent than phenothiazine and is being tried on all classes of livestock. Early indications are that this drug is effective against species of worms which are not responsive to phenothiazine.

Most of the older chemical treatments have been with us for several decades. Copper sulphate (bluestone), nicotine sulphate, carbon tetrachloride, tetrachloroethylene and arsenicals are still widely used with varying success. Sodium fluoride and hygromycin, used in controlling worms in hogs, should not be used on ruminants.

In my opinion, the question of chemical treatment requires technical judgment. I do not mean to state that only a veterinarian should treat livestock for internal parasites. But I do believe that the farmer who is going to use chemicals should first discuss a general treatment program with his local veterinarian, whose job it is to know the regional parasite problem and how to combat it.

Many stockmen, especially sheep raisers, dread the threat of tapeworms. The fear may be exaggerated (except in the case of fringed tapeworms which are a serious problem in western sheep). Common tapeworms kill or cause serious injury to few animals. However, because of the feed tapeworms consume, they should be eliminated. Where tapeworm segments are found in livestock droppings, treatment should be given by a veterinarian, for the chemicals require care and experience. Poor haircoats, diarrhea and other symptoms of roundworms are not seen in tapeworm cases.

Hogs, poultry and horses, all single-stomached animals, harbor worms closely related to those in ruminants. Treatment varies. Different chemicals are usually employed, although low-level feeding of phenothiazine-salt for specific worm control has been successful with many Kentucky horse breeders.

Without farmer cooperation, our veterinary science, our chemical research, our parasite studies, our drugs and professional skills and clinical experiences so easily add up to mere curative measures. Parasitic prevention on the other hand, starts with enlightened farmers. Good management is the best preventive we know.

THE AUTHOR: Dr. William M. Romane is associate professor of veterinary medicine and surgery at the Agricultural and Mechanical College of Texas, College Station, Texas.

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FARM BOOKS

(*Continued from page* 46)

living of the events of this period of great change will be of even greater interest than the biography of the man himself. Wickard's life history is almost an ideal one for telling the story of agriculture during this century. He was one of the first farm boys in this county to attend Purdue University with the intention of returning to farming as a life work; he made money as a farmer during World War I and he saw the price of corn drop to a point where it was more economical to burn it for fuel than feed it to pigs; he was president of his county Farm Bureau and was given the Master Farmer award; and he was an assistant, a department head, an Assistant Secretary, Secretary, and finally REA Administrator in the Department of Agriculture during the most turbulent period of this century. Dean Albertson, the author, is an historian and his subject gives him fullest scope.

—*G.G.C.*

Cowboy Arithmetic, Cattle as an Investment, *by Harold L. Oppenheimer, The Interstate, Danville, Illinois, $4.95.*

The first thing that must be said about this book is that it is not just a manual of accounting for the cattle industry. Rather, as the subtitle suggests, it takes up the subject of cattle as an investment, and in doing so spreads itself all over the map. Harold Oppenheimer is certainly well qualified to write a book of this type. As head of Oppenheimer Industries, Inc., he is an authority on cattle investments. His chapters on such aspects of the business as using government land, tax aspects of the cattle industry, ranching as a business, market play, prices and cycles, and cattle financing are exactly what the purchaser of the book will be seeking. He could well have let himself go on these subjects and expanded this material with more detail. Instead, much space is given to a lot of elementary material which has been gone over so often before.

The object seems to have been to produce a book for the tyro. It would make an excellent text in a livestock production and market course. The old hands at the game are asking a lot of searching questions these days. They won't find the answers here, though Mr. Oppenheimer could no doubt have given them some valuable suggestions had he really let himself go.—*C.R.K.*

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, JULY 2, 1946 AND JUNE 11, 1960, SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF THE FARM QUARTERLY.

Published quarterly at Cintl., Ohio, for Oct. 1, 1961.

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3. There are no bondholders, mortgagees, and other security holders.
4. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the four quarters preceding the date shown above was 270,144.

(Signed) Frederic B. Knoop, Publisher

Sworn to and subscribed before me this 20th day of Sept., 1961. (Signed) Clifford Laemmle

(My commission expires October 5, 1963)

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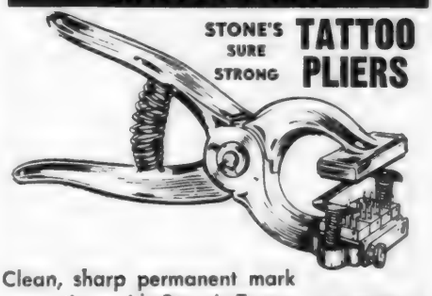

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Mr. C. J. (Clint) Cooper is pictured above with two of his purebred Yorkshire pigs. He stands between two of the original Caswell "Farro-Crates" purchased in 1955. Mr. Cooper is Vice President of the Iowa Yorkshire Breeders Association. He has had three certified Yorkshire boars and received the top 4 cutting litters at the National Yorkshire Type Conference in 1961. He averages about 70 farrowings yearly in 26 Caswell Farro-Crates.

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IRRIGATION IS CROP INSURANCE

(*Continued from page* 57)

compass—determine the layout of a field, unless the land happens to lie as level as a floor. Even then, some scraping and filling is sure to be required, if only to achieve the necessary fall to carry water. On gently rolling land, planting on the contours makes gravity irrigation possible. Irrigation is possible on rolling land with grades to six percent if the irrigator is willing to pay the price of grading the land into nearly level benches. Benching runs up the cost. It takes something like $100 to $110 worth of earth moving per acre to bench, compared with about half that where only leveling is required.

Berms at the boundaries of the benches take land out of production and may result in some field strips only eight corn rows wide. Where subsoil is exposed, it takes two or three years of tillage and 10 to 12 pounds of zinc sulphate per acre to get yields up to normal. But the most objectionable feature of contour benches, according to Edmund Lauer of McCook, Nebraska, who has recently developed his farm for irrigation, is the hand work required to construct field ditches. Benched fields require permanent drops of steel or concrete to keep the water at a constant depth. Ditches here, as on flat land, are dug with a machine rather like an oversized plow with moldboards set back to back. In benched fields, an irrigator must take shovel in hand to complete the ditch around the drops.

No matter what land forming may be required, the practical row length for gravity irrigation is limited to about 1,600 feet. Rows a quarter of a mile long (80 rods) are common. But shorter rows are unavoidable in contour-planted fields.

If he irrigates from a canal, a farmer must deal with the water authority. He needs turnouts. These are openings in the canal bank equipped with guillotine-type gates. Control of water is by a heavy screw, turned by a wheel about the size of an auto steering wheel. The amount of water an irrigator pays for is determined by precise measurement along the screw to see how high the gate is lifted, multiplied by the time the gate is open. No one but the official ditch rider is allowed to tamper with the gates. He rides a pickup truck on the service road which runs alongside all canals.

From the turnout, a farmer must provide a permanent ditch to lead the water conveniently near the fields he wants to irrigate. Where this ditch ends or makes a turn, he needs concrete distributing boxes or curbs to prevent erosion.

Otherwise, an irrigator goes at his cropping very much as a farmer in the humid Eastern Corn Belt does. He uses 4-row equipment to plant and cultivate. He may apply nitrogen before planting, or sidedress. He uses soil insecticides and herbicides, plants for heavy stands. Only at the last cultivation an irrigator takes special pains to "ridge for irrigation"; that is, to leave a clean furrow midway between rows to carry water across the field. An eight-inch sweep between two six-inch sweeps on the rear cultivator gang will do it. A cleaner job results from using disk hillers.

Headlands go unplanted. At least the upper headland must be left clear for plowing out the field ditch or laying gated pipe. With a husky tractor on the ditcher, an irrigator can plow out a channel 18 to 24 inches deep in two or three passes. Not that deep below the field surface, but from the top of the banks. Banks of loessal soil hold water to within three or four inches of the top. If a leak develops because of weeds or other trash at the surface line, some plastic sheeting will repair it.

Instead of the field ditch, many irrigators now use gated pipe. More often, gated pipe is used in connection with some field ditching. This is large diameter aluminum pipe with a slide-covered opening every 40 inches. This slide—or gate—is adjustable to an infinite number of settings. One advantage is that the pipe can be run full of water and so maintain an even flow from all openings. A ditch always calls for check dams at intervals to keep the water level constant from end to end. Check dams are made of plastic sheeting laid in the ditch, with the high end supported by wrapping around a stick. But the most important advantage of gated pipe is that it does away with the siphon tube.

Starting siphon tubes—one or more for each row of crops—is a skill that irrigators soon acquire through necessity and endless practice. It's a neat trick to watch: Lower the tube in the ditch,

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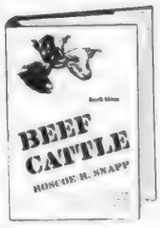

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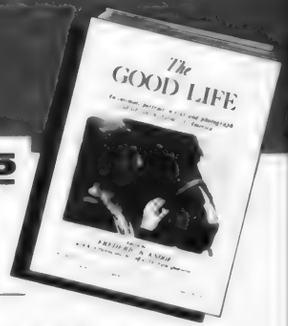

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smack one hand over the end; pull the tube quickly over the bank and let go. The diameter of the tube regulates the amount of water that goes rippling down between the corn rows, soaking as it goes. Kids, especially, soon catch on. But the task of the irrigator is to soak the soil to field capacity, and no more, everywhere in the field at the same time. His first objective is to "get water through" to the far end of the field. To this end, he starts a fast flow, using two or three siphon tubes of ¾-inch diameter; or he starts out with a single 2-inch tube. When the water gets through he cuts the flow by removing tubes, or replacing them with smaller ones.

The irrigation authority is fussy about water use. It is willing to supply enough, but never so much that any leaches down too deep for crops to benefit. Farmers are concerned, of course, to avoid leaching nitrates out of the root zone. The authority objects to waste at the lower ends of fields, or through breaks in field ditches, and farmers are well aware that irrigation water isn't free. Moreover, they are in a hurry to get water on just as soon as possible after corn reaches the pre-tassel stage. Few can water all their fields at one time. The flow of water moves from field to field.

The result, in the field of a skillful irrigator, is that there is a trickle of water between every pair of rows, a trickle of constant volume from the point where it spills from the siphon tube to the far end of the field. The field ditches stand nearly full, with the same depth of water from inlet to the end. There is water leaping and sparkling as it falls across the check dams and down the drops, yet not a cupful gets beyound the confines of the field where all this volume is being spread. An inch beyond the boundaries an irrigator sets for water the soil is dry.

To water a field may take from two to four or five days. Meanwhile the system requires attention. Morning and evening, irrigators are out in boots, armed with shovels, checking their tubes and check dams, alert for breaks and leaks. A thunderstorm may cause some breakouts without adding substantially to the water ration for the crop. If water doesn't get through quickly in some rows, the irrigator puts in an extra tube. Minnows may get their heads started into a tube, be a trifle too fat to pass through and so plug it up. Weeds can slow up the flow from a distribution box.

If water is in short supply, an irrigator has no choice but to start in every other row with a tube large enough to get water through. Short rows are a problem. Carl Schafer of Culbertson, Nebraska, an irrigator with 35 years experience, runs his field ditch into a length of gated pipe to water rows as short as one rod. The gates can be adjusted until the water barely oozes. Wide open, the gates pour out as much as a large diameter tube. It takes experience and irrigation sense to water short rows without waste.

While the farmer who takes his water from a canal must call headquarters and wait for the ditch rider to open or close the gate, those like Keith Fastenau who operate with wells can pump at will. And break some rules, if it suits their purposes. Bob Wolf of Albion, Nebraska, runs excess water through one big field faster than it can soak in, collects the excess at the lower end in a catch basin. Then he uses a rotary pump to lift it to a field across the valley. Otherwise, he would need a half mile of extra pipe or another well. Other irrigators use rotary pumps with tractor power to lift water to high fields from inlet ditches.

Two waterings are basic for corn, but in a dry season farmers irrigate three, four or five times—until corn begins to dent. When there is no more need for water they take up the gated pipe, fill in the field ditches. At harvest time there is no sure way to tell that corn was irrigated except for the thick stand and heavy yield.

Wheatfields on level land are soaked down before planting time in the fall by furrowing as if planted to a row crop. But spring waterings are made by sending a flow across the surface. This is the method used for alfalfa and grass pastures, too, although a new method called corrugation spreads water more evenly. Corrugation consists of cutting very shallow furrows spaced 30 or 40 inches. The tool is designed to do very little injury to the crop. John Deere is one maker, among others.

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Fred Fastenau estimates that his total investment in irrigation structures and equipment for 350 acres is less than $9,000. He

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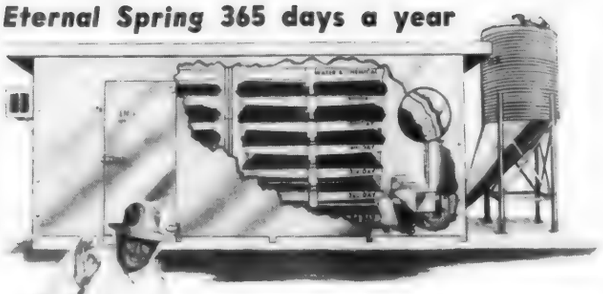

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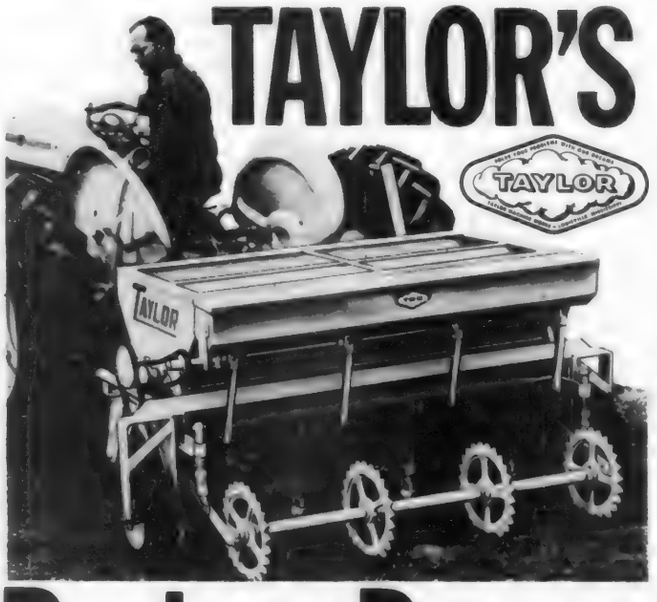

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gets water from "The Tri-County" system for $2.75 an acre, regardless of the amount he uses. He contracts for it ahead of the crop season. His irrigation costs are just about rockbottom. The only rub is that "The Tri-County" water supply is being used to the limit. Fastenau would have used more on his 1961 corn crop in August had it been available.

Well irrigators have higher costs. Dale Mahaffie, a farm owner who lives in Holdrege, has invested $6,500 in a well, plus $3,500 in pipe to distribute water on 120 acres—a total of $10,000. But before irrigation his share of the farm income was running $850 a year. Last year it was up to $4,500 and he and his tenant had 24,000 bushels of grain stored on the farm before this year's crops were in. They were considering plans to move into cattle feeding.

Keith Fastenau has a deep well that watered 125 acres of row crops last year at a fuel cost of $235. He ran his industrial-type pumping engine on natural gas. This is the lowest cost fuel in the area. Other irrigators use diesel fuel, or propane. A few use gasoline, and about 25 percent pump with electric power.

Total investment per farm varies tremendously. Edmond Lauer has invested nearly $27,000 in shifting from dryland farming to irrigation on his two quarter sections in Red Willow County near McCook. His rolling land required contour benches, a big waterway for surface drainage, and other land forming. This figure includes $17,000 for a new 30,000-bushel grain storage building and crop dryer to handle the corn he is now producing. Lauer gets irrigation water from Trenton Dam, a Bureau of Reclamation project, at a cost which last year came to a total of $1,186.30 for the farm, or $5.21 per acre irrigated.

At Juniata, near Hastings, Raymond Janssen has invested a total of $10,744 in developing a quarter section for irrigation with a deep well. Of this total, $7,625 went for the well, the engine and accessory equipment. He can water 125 acres of cropland.

Cost Cutting

The extra investments and operating costs on irrigated farms put a premium on skillful management. It takes consistent high yields, low field losses, a tight operation all around, to compete successfully with farmers in humid parts of the Corn Belt. Irrigators study any promised means of cost cutting with a calculating eye. Minimum tillage is one shortcut under scrutiny.

One of the extra costs not mentioned heretofore is the necessity for one-way plowing on fields leveled up for gravity irrigation. Backfurrows and deadfurrows would undo the landforming. Irrigators are compelled to invest in plows with two sets of bottoms to throw furrows either right or left, depending on the direction of travel.

Bob Wolf of Wolf Brothers and Reich, at Albion, is pioneering minimum tillage with four-row equipment on irrigated fields. Last spring he used a prototype model of a 4-row till-planter under development by the Dempster Company. This equipment works up four strips of soil for the new corn rows, applies fertilizer to one side, puts down soil insecticides in granular form and granular herbicides as well, if desired, in addition to seed. At every pass it does a complete job of seedbed making and planting, with the speed of a conventional four-row planter.

Wolf Brothers and Reich got excellent stands. Bob Wolf believes he can grow corn as good or better by this method than with conventional tillage. The seed goes into fresh, moist soil that is first loosened, then firmed below and around the seed with a precision scarcely possible with successive operation of plowing, fitting and planting. Last year they averaged 120 bushels to the acre of No. 2 dry shelled corn on 300 irrigated acres.

The only preparation needed for corn to be planted in stalk fields is to shred the stalks. Most growers might want to level off the old ridges with a disk, but Wolf didn't. This work can be done in the fall. Two cultivations, and treatment for corn borer complete the cycle of operations, except for watering the crop, up to harvest time. If Bob Wolf is right, this once-over minimum tillage method fits corn growing under irrigation to a T.

THE AUTHOR: Norman Reeder is that rare individual, a farmer and a journalist. For years he has contributed to most of the national farm magazines while also operating his beef farm at Grand Ledge, Michigan.

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SNOWBOUND

(*Continued from page* 67)

tains and beyond, eternally.

It was 116 days before I saw another person, except Vern.

We knew that we would be snowbound for a time, but we hadn't understood that there would be spiritual as well as material problems. The first and most complex was the silence. The wind died down after the fifth day of the blizzard and the silence came, a silence so intense that we found ourselves speaking in whispers. The teakettle, simmering on the stove, was like the roar of a train. We could hear the cattle, 50 yards away, chewing on their hay, and an exploring mouse under the floor sounded not unlike a bull making a quick tour of a china shop.

There was no measuring stick for sound, no background of experience to tell us how far our voices would carry. This strange hush became a part of us. To me it seemed that Vern and myself, the dog, the cattle, and the endless waste of white were suspended in time and space. We waited, sometimes we held our breath unconsciously, waiting for something, someone, to break the silence.

On Christmas Day the battery for our radio petered out; we had no spare. We had husbanded the power for the daily weather and news reports, but we kept it on until midnight Christmas Eve for the caroling. In the morning it failed to rally.

The days ran one into another and fell into an oft-repeated pattern. Vern stretched out chore time as much as the cold would allow; we read a great deal, going over again a two-years' collection of Reader's Digests and a shelf of paperbacks. We played gin and checkers. The daily battle with the cold kept us from being bored. We discovered that we had overlooked a multitude of cracks in the flimsy weatherboarding and around the windows. When we ran out of newspapers and old rags, we sacrificed two volumes of the history of Idaho which we had inherited with the place. The discovery of a nail hole, which could funnel in an unbelievable blast of cold air, was an event.

We kept the big heater in the living room red-hot. The bedroom was abandoned in the early days of our seclusion. One morning we awoke to find the little breathing holes in our blankets covered with frost. We moved the bed into the living room and Vern awoke periodically during the night, reached for a hunk of fuel, chucked it into the stove, and went back to sleep.

Vern milked the four cows morning and evening; milking with one hand, the other tucked inside his jacket. When the milking hand stiffened with the cold, he switched. Except for a tiny pool in the center of the bucket, the milk was frozen solid by the time he carried it to the house. We treasured that milk and never ceased to be grateful to the thoughtful neighbor who had sensed our need and loaned us the cows to help us through the winter.

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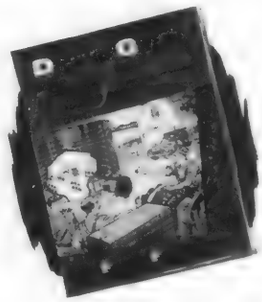

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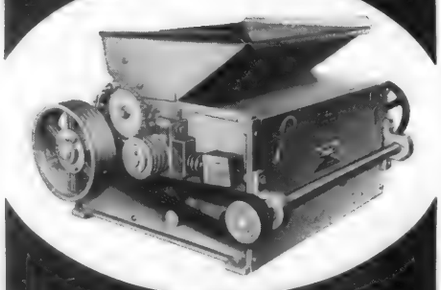

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From a Duncan Hines cookbook we devised a game as a psychological antidote for our monotonous fare of beans and elk steak. We read the exotic recipes from faraway places and then either manufactured a passable substitute or arbitrarily tagged whatever we had with the name of some alien delicacy. One morning when Vern asked the inevitable question, "What's for breakfast?", I did not give him the inevitable answer, "Hotcakes and oatmeal."

"You're having crepes suzette this morning," I said proudly. They were hotcakes, but I trickled a spoonful of our precious brandy over the stack, set it afire, and served him. He was very complimentary, and treated me with a running conversation in his college French while he went through three stacks.

I helped Vern shovel and tramp out a trail to the water hole 50 yards below the barn. Each morning, followed by the cattle and Blaze, he went to the hole and chopped out the ice. The hole got smaller and smaller and deeper and deeper. Finally only one animal at a time could drink, almost standing on its head. One morning a steer slid into the water and before we could hitch up Blaze and drag him out, the ice had frozen around him. Thereafter, every morning Vern scattered a bucket of ashes on the ice to provide a footing.

A few days after a ten-day spell of 40 below set in, Vern found two of the hens under the roost on their backs, frozen solid, their feet still curved to clutch the roost. The next morning, two more were dead, and on the third morning, two more. A conference on this strange two-a-day casualty list produced the startling conclusion that the two hens on the end of the roost, not having the insulation of their sisters except on one side, had frozen on the exposed side. This was just as fatal as being frozen on both sides.

Vern then built a fire of chips and straw in a five-gallon can in the henhouse about midnight each night. This gave the chickens a headstart which lasted them until morning, when the temperature came up 10 or 15 degrees. Roscoe, the red rooster, may God rest him, was an early casualty. He froze on his roost in the barn, just when, we didn't know. He must have been in the deep-freeze for days. Vern said that he had not seen him moving around, and one morning had nudged him gently with the hayfork. He toppled off his perch and hit the floor with a thud. Vern set him back on the beam and there he sat until spring, a silent sentinel who would never again greet the morn with his cracked, old crow.

To conserve our dwindling feed, Vern cut the hay ration to the cattle early in December. This brought its penalty when the bitter weather set in. Cattle can endure remarkably cold weather, even in the open. But six weeks of cold, when the temperature never got above zero, including ten continuous days of 40 below, will affect even the most hardy, and our stock was by no means in the best condition. A touch of

the sniffles, which tough range cattle usually throw off, was fatal to four of our little herd before the winter was over. If an animal felt too sick to get to his feet, the cold quickly finished him off. Vern and I rolled a sick steer onto a square of canvas, lashed the canvas to the saddlehorn of the mare, and dragged the animal to the kitchen door. We inched him into the kitchen in front of the stove and gave him hot toddies and covered him with all our blankets, but he failed to last out the night.

Our nearest neighbor, and loyal friend, was Forest Sifton, an Englishman, who each year sent his family to Weiser so that his children could attend school. He lived alone with a collie dog from September to June. Without his sympathy and help it is doubtful that we could have survived that first hard year. He helped Vern with the branding and haying, loaned us his machinery and the four cows. It was he who had walked over one day with the red rooster under his arm. "Even hens need a man around," he had said. "This gentleman is getting quite old, but he's a solid citizen, and will do his duty. His name is Roscoe."

It was understood that Mr. Sifton would come over for Christmas dinner. We had arranged a series of lamplight signals for emergencies. It was agreed that the absence of a light meant big trouble. On Christmas Eve we looked out across the snow, but the familiar beacon was not there. After waiting for half an hour, Vern put on all the clothes he could carry and started out. The snow was four and five feet deep and was crusted, but not enough. At times it would support his weight for a step or two, then give way. I stood by the window for three hours before a light appeared in Mr. Sifton's window and I knew that Vern had arrived safely. Then the light flashed twice, which indicated that Mr. Sifton was all right, then three times, meaning that Vern would not return until morning.

He came in about dawn, scooting across the snow, without Mr. Sifton. He had found two big shingles and had lashed them to his shoes, giving him the necessary surface to ride the crust. Mr. Sifton had been busy with midwifery and had forgotten to light the lantern in the upstairs window. His collie was in labor and gave birth to a litter of pups during the night. The litter turned out to be half coyote. Mr. Sifton loved the dog as only a lonely man can, and did not want to leave her alone with her first litter. So we had no guest for Christmas dinner.

We sat down alone for our first Christmas dinner. It was just another meal, although it was enhanced by a can of cranberries I had saved. But it will remain forever in my memory, for it was to reveal to both of us the deep and enduring love we shared. As we sat down I asked Vern to say grace. He slowly looked at the table, then at me, and began. "Oh Lord, we thank thee for—" Then there was a long silence—"these cranberries—and each other." His last words touched my heart. We had had so little time to indulge in sentiment, and both of us had

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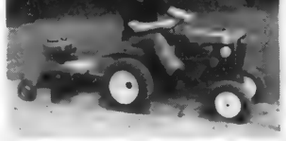

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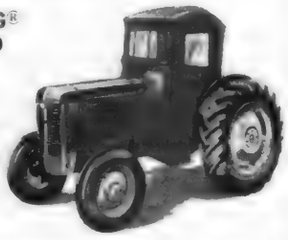

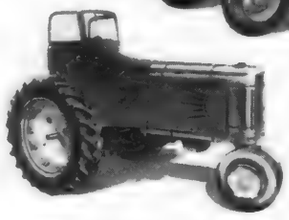

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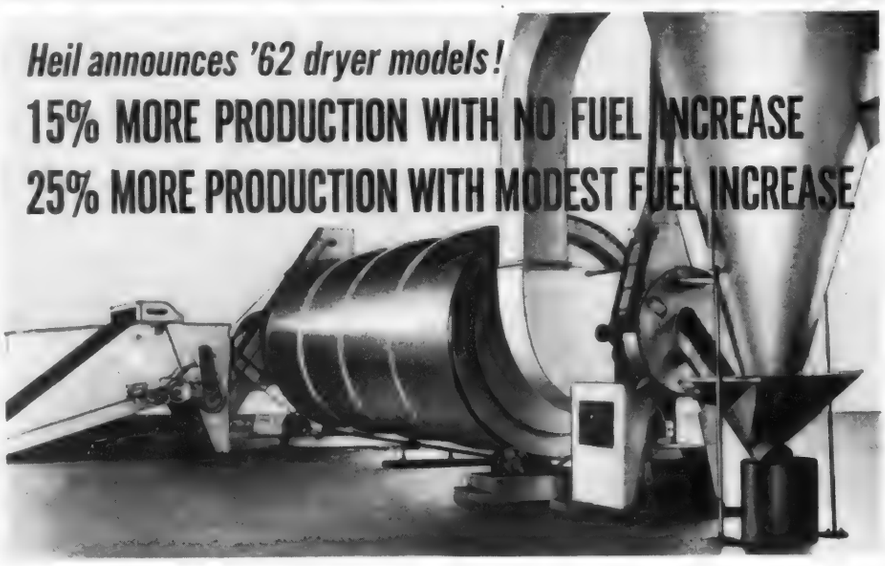

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taken our love for granted. I looked across the table at his folded hands, calloused and swollen. One frostbitten ear was red and angry. His eyes traveled to my hands, dishwater hands, and to my broken nails and the wisps of hair escaping from my woolen scarf. Neither of us spoke—we ate in silence, but there never was a greater, more peaceful, more eloquent silence. All our sacrifices, past and to come, would be endured, for we had each other.

Our food problem became acute soon after Christmas. It was not quantity but quality that pinched us, for we were never in danger of going hungry. Vern had shot a big bull elk just before the blizzard, and his carcass, hung in the woodhouse and frozen solid, provided all the meat we wanted, a little tough, but nourishing. We missed fresh vegetables most; after that winter neither of us was ever very fond of beans.

It was on Lincoln's birthday that events were set in motion which resulted in my greatest gastronomic feat. On that day Vern came in from feeding the chickens, as excited as a small boy with his first popgun. "How would you like to have an egg for breakfast?" he asked.

There had been a couple of days of moderate weather—the temperature actually went above zero in the afternoon—and one of the more ambitious hens, mistaking this for spring, had produced an egg. Vern found it before it froze and proudly bore it to the house. He placed it tenderly on the kitchen table and we sat there and drank our coffee and admired it. "It's for you," he said. "It's your hen."

"No," I said, "you found it, and you're the man of the house and need the strength."

We argued for three days about who would eat the egg. Vern even refused to accept my compromise—to scramble it and each eat half.

Then I got the inspiration of making a cake with it. A one-egg cake would not be much in size or quality, since I lacked some of the other necessary ingredients, but a cake of any kind would be a treat.

I wrote three notes, folded them, and stirred them in with the batter. On the first was "Good for one kiss"; on the second, "Good for one bone"; and on the third, "Good for one lipstick." I cut the cake in three equal pieces at dinner that evening. Of course, the dog got the kiss, I got the bone, and Vern got the lipstick. But we had fun.

We had more setbacks than happy events in February. Vern came in from the barn one morning with a face longer than old Blaze's. One of the heifers had dropped a calf during the night and Vern had found it frozen as stiff as a mackerel. In subzero temperatures a calf born during the night has little chance of survival. Thereafter, when a heifer seemed to be nearing her time, Vern made around-the-clock hourly visits to the barn. Two weeks later, when another heifer appeared to be expecting, he sat up with her. Her calf was born at three

o'clock in the morning. Vern wrapped it in a grain sack and brought into the kitchen, where we dried it off and took it back to its mother for its first breakfast. If a cow can dry her calf, or if it can get a spot of sunshine before the bitter cold gets to it, it will take a surprising amount of rough weather.

These crises and near crises became routine during those long, lonely months. The first break came on the 117th day of our isolation. We saw a mounted rider; leading two pack horses, plowing through the drifts along the distant road. We could hardly believe what we saw—it must be a mirage or an hallucination, for it certainly could not be the mailman. But he was real—slightly frostbitten, but real. It had taken him three days to make the fifty miles from Weiser. He brought us more than three months' accumulation of newspapers, magazines and very welcome letters from friends and relatives. Included were two sacks of the New York Times, daily and Sunday, quite useless to us except as kindling and ancient history. We plied the mailman with hot coffee and questions, trying to catch up on what had happened in the community since we had left it. When he finally rode off we shouted questions at him as long as he was within earshot.

A chinook in late February had lowered the snow level somewhat, but in April came the big thaw. In two days four feet of snow disappeared in rushing torrents down every creek and wash. The first tender grass appeared on the sunny slopes, and Vern turned the cattle out on the range.

It was on the afternoon of the second day of the big thaw that I received a postgraduate course in survival on a mountain ranch. Vern had saddled Blaze and was riding fence. I started the evening chores early, and was scooping up a bucket of feed for the chickens in the little shed which served as a granary for our closely hoarded oats. I had my back to the door. There was no window in the shed and when the shadows suddenly deepened I knew there was someone, or something, standing in the doorway. Startled, I turned around and saw the biggest bear in all Idaho calmly surveying the interior of the shed—and me. My first impulse was to scream and run; but who would hear my scream, and where would I run? He had me trapped. "Maybe if I just stand still he will go away," I thought to myself.

He had apparently just come out of his winter hibernation, was lean and hungry-looking, and not quite bright yet. Neither of us moved for what seemed hours, I from fright, the bear, no doubt, because he was a slow thinker. He had been standing half erect, his forepaws hanging down like a begging dog's. Finally his little bear brain decided that I smelled like something good to eat and would reward further investigation. He leaned forward and placed his forefeet on the door sill. I could restrain myself no longer. With a wild impulse of self-preservation I swung the scoop with all the desperate strength I could get out of my 105 pounds. The blow landed squarely on his

MONTHLY PHOTO REPORT — NEWEST DEVELOPMENTS for Progressive Farms

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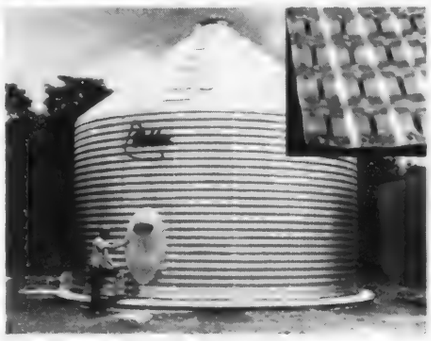

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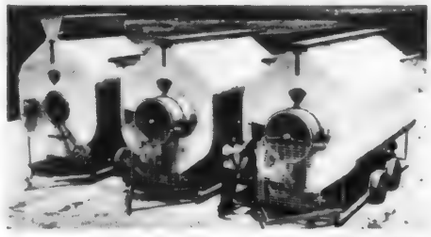
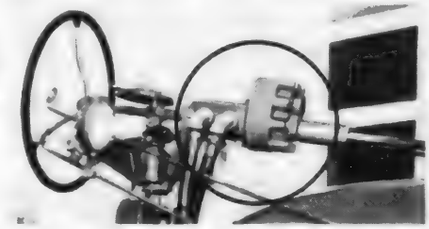
No Frame to Build. Just bolt together heavy-gauge, 3″ corrugated steel panels to erect this building. For farm or town. Use as garage, milking parlor, repair shop, meeting hall, etc. Comes in 35′ x 20′ units with choice of 10′ or 14′ wall heights. Combine units to form building of any length. Door, window selection. Expandable. *Behlen Mfg. Co., Columbus, Nebr.*

Expandable Multi-Purpose Building. All-steel Curvet of *Behlen Mfg. Co., Columbus, Nebr.*, designed for expansion to any length. Two utility models for machinery, tool shop, other uses, in 40′ and 53′ widths. Special 40′-wide grain storage model, with reinforced walls can store grain without tie rods. With drying floor, automatic unloading.

Frameless Straightwall Building gives clear interior for warehousing, implements, tool shop. Also stores grain 12′ high against sidewalls. Steel partitions available to separate grain and utility areas. Two steel models, grain storage with 30° pitch roof. Utility building with 16° roof. 39′ and 52′ widths. *Behlen Mfg. Co., Columbus, Nebr.*



Three Models of Grain Dryers, 270, 375, 500-bu. capacities, are batch-type, portable. Can keep ahead of harvest crews, dry a 500-bu. batch of 30% corn in 2½ hours. Burn LP or natural gas. Operate off PTO or electricity. Also 750-bu. size. *Behlen Mfg. Co., Columbus, Nebr.*



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snout. He reared up, squealed like a stuck pig, sat down and began to rub his nose. I slammed the door and propped the scoop against it.

Through a crack I saw him sit there for a long time, trying to figure out what had happened to him. Finally he ambled off toward the house. On the way, as he passed near the chickenhouse, he caught a whiff of fresh poultry. Here was an odor he recognized. He made two turns around the little shack, looked into the window under the eaves, and finally discovered the door. One push snapped the wire latch and he walked in.

As they say out here, when at a loss to describe an indescribable event, "all hell broke loose." I heard the dying squawk of a hen as the bear caught her. I must save those hens. Forgetting my decision to remain in the granary until Vern came home, I made a dash for the house. On the way I remembered that Vern had taken the rifle with him. But there was still his 45, which I had fired once or twice at a mark a long time ago. I found the pistol, but the clip was not with it. I took a handful of ammunition and, loading as I ran, I rushed to the aid of my embattled flock. Since I would need time to load after each shot, I decided against a frontal attack through the door. Sneaking around the corner, I made a quick grab at the latch, pulled the door closed and wired it tight. Then I went to the window and peered inside. The bear had apparently finished off his first hen and was in pursuit of another. There was a welter of flying chickens and flailing paws as the bear tried to snatch them in midair. I aimed at the mass of feathers and bear, and fired.

If the bear had been pained and surprised by the blow from the scoop, the impact of the 45 slug compounded both his pain and his surprise. He howled, and began biting and scratching his left ham. He made a charge at the door, then at the roosts and nests, which came down with a crash. I was fearful that he might break out of the flimsy building, and my fingers were all thumbs as I reloaded. This time I took more careful aim. My second shot, we found later, broke his spine. His hindquarters went down and he began dragging himself toward the door. My third shot finished him off.

I stood by the little window for a long, long time, looking inside

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at the ruin of my flock, the bear, and the furnishings. I never saw so many feathers, outside a featherbed, in all my life. I had a moment of regret for the bear, but more for my hens.

I went to the house and started supper. I saw Vern ride in, whistling. He unsaddled Blaze, led her around to her stall, and fed her. As he came in he greeted me with our stock phrase, "Well, what's new?" That phrase had become rather threadbare during the long months we were snowbound. When he came back into the house, even after a ten-minute chore, he got a laugh with it. Now it had special meaning, for he had been gone four hours, and one could expect earth-shaking events had taken place during such a prolonged absence.

I did not disappoint him.

"Oh, nothing important, except there's a dead bear in the henhouse."

"That's nice," then he did a doubletake.

We went to the henhouse; the bear was very dead, and so were 10 of the 18 chickens that had survived the winter. But I did have something new to tell Vern.

We had another big surprise in late spring. The grass was long and green in our meadows and pastures, and the cattle were getting fat. Some of the grass, under fence, we were saving for hay, and for that reason had taken the cattle to our public range. The 900 acres to which we had title included public range for approximately 100 head of stock. We didn't know that we had only second rights; first rights were held by a sheepman who, many years before, when the laws were more elastic, had made a tremendous landgrab. He had never owned enough sheep to use all the range, and ranchers in the valley had secured temporary second rights. These, we learned, were not worth a hoot if the holder of the first rights wanted to preempt them.

There was a continual seesaw war going on between the cattlemen and the sheepmen, a twice-told tale in the West. However, unlike the wars elsewhere, in our private Idaho war the sheepmen held the upper hand. Our first skirmish was bloodless, but it was also decisive and, in all fairness, was won by the dog. At least he was the hero who backed me in the pinch.

Vern was away checking the cattle. It was a fine day, and I had the doors open and was airing the house when I heard King barking. It was no coyote or jackrabbit, but one of alarm and warning. I went to the back of the house where I could see him and my heart popped into my mouth. The field was covered with sheep. There were hundreds of sheep on the slope from the house to the base of the mountain. This was our best grass. We had kept the cattle off and counted on it to provide the hay for the winter. Now, at least three bands of sheep, perhaps two or three thousand, were at work on it and it would take only a few

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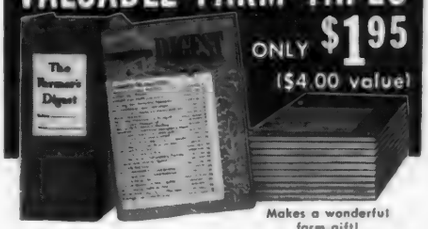

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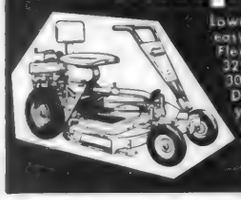

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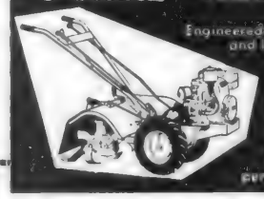

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hours to strip it down to the roots. Our hay crop was in jeopardy. Those sheep had to move off at once.

I saw the shepherd standing on a rise, gazing contentedly at his flock making wool and lamb chops out of our grass. I went inside, snatched the 45 from the table, and started hotfoot for the shepherd. King wanted to close with the enemy at once, but I called him to heel and walked up to get a close look at the shepherd. He was a Basque, as I had expected, and he was unarmed. I flourished the 45 and asked him what he was doing on our land.

"This is Mr. Taylor's range."

"This is not Mr. Taylor's range," I replied as ferociously as I could. "This is our own private property and I want you to get those sheep off at once."

"But this is Mr. Taylor's range," he insisted, not moving.

I fired the 45 in the air and called to King, "Get 'em going!" King was ready and willing. He seemed to know what was wanted of him and how it was to be done. He circled the stragglers on the fringes of the band and soon had them galloping into the mass around the shepherd. Sheep being what they are, the whole band broke into a wild stampede for open range. In a few minutes they were out of sight.

Under the sun and the warm winds, the grass grew and the cattle fattened. Vern took our last cash and sent to the Washington Experiment Station for a revolutionary new grass seed. We drilled the seed in twelve acres of a tillable field along the creek, weeded it by hand, and harvested a bumper crop of No. 1 Wheat Grass seed, the first produced in Idaho. Our check for the seed paid off the most pressing of our debts and we had enough left over for a pickup full of supplies. This included a lipstick for me, my first in a year.

We made preparations for the second winter with a good deal more know-how and confidence. We knew that it could not possibly be worse than the first and we had better weapons to combat it.

Our first year brought other rewards. We made the happy discovery that our neighbors were sensitive, well-informed people. Many of them were college graduates; they spent the long winters reading, listening to the radio, and talking. Above all they were self-reliant, they had time to think, and they loved the freedom of this frontier. They did not regard themselves as unusual because they were, in this era of celestial probes, living in a projection of the horse-and-buggy days.

There have been few changes in western Idaho since that first year. We still lack electricity, telephone and a paved road. This past winter we were almost as cold and isolated as the first. Ranchers around here say the first year is the hardest, after that it gets worse. But we stay on, for in spite of its hardships and backbreaking work, we like ranching, and know that it is the best of all possible worlds for us.

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CONTROLS

(*Continued from page* 73)

—widely used to describe the whole class of its type. Many firms make such a switch. The Micro-Switch is small, operates with tiny pressures, and with very little movement of the switch handle. Thus is is used in much automatic equipment where there isn't much power to throw a heavy switch, like a thermostat. They cost from $5 up.

Another switch, requiring even less strength to operate, is the mercury switch. Costing around $2 to $3, this switch is very commonly used in automatic controls. It's a sealed tube with two electrodes inside at one end, not touching. The same tube contains a little bubble of mercury. Tilt the tube away from the electrodes, the switch is open. Tilt it the other way, the mercury closes the gap between the two electrodes and the switch is closed; electricity can pass. This switch is ideal for dusty areas, as it's completely sealed, and it is fine for frequent on-off uses. It won't carry heavy currents like those necessary to start a motor but will, for instance, switch incubator heaters on or off. And it is frequently used in thermostats, as it requires practically no power to turn on and off.

Also there are speed-sensing switches, that will indicate that an auger is actually rotating (not merely that the power is on).

Remote Switches

Relays are the elite of the switch group. There is a vast range of different relays, but all are switches, usually multiple, and usually operated by remote control. A typical relay may be a group of five switches, all operating together, perhaps three opening circuits, two closing circuits. The individual switches are referred to as "normally open" and "normally closed." As the relay is actuated, the open switches close, and the closed ones open. Small relays, for light currents, start at 25 cents. Motor starter relays won't cost much under $25 for a small motor. They become much more expensive as horsepower rises. A typical one, from Westinghouse Electric, costs $308 for a 100-hp motor.

Many relays are magnetically operated. Motor starters are this type. The starter is actuated by pushing a start button. This sends current through a coil in the starter, which acts as an electromagnet, attracting a metal plunger which brings the switch contacts together. Cut off this current to the coil, and a spring returns the plunger, pushing the contacts apart. Why doesn't this happen when you release the start button? Because the motor starter "holds itself on." You press the button, completing the magnetic coil circuit. The relay operates. Immediately, the magnetic coil is powered directly through one of its own switches, not through the start button, but through the relay. How do you stop it? Well, the stop button is put in this "holding" circuit. The stop button is normally closed. When you press the stop, you open this switch, cut the current to the magnet, the spring separates the contacts, and the motor stops. And you can have ten stop buttons in ten different places, all in the same loop of wire. Push any one and the motor stops. Likewise with the start button; you can have several.

The tremendous versatility of the relay allows zillions of combinations of motor starting. Perhaps you need to start two motors, one after the other—the hammermill first, then an auger feed. You want to be certain the mill is running to speed before the auger begins moving feed to the mill. All right. A pushbutton starts the mill through a magnetic starter. Push the button, the contacts close, and hold themselves closed. Now, to an extra set of contacts are joined the wires for the magnet of a second motor starter for the auger, but these wires go through a time delay switch. This delay can be anything from seconds to hours. After the chosen delay, the second motor starts. The sequence may be repeated as many times as necessary, for dozens of motors. And it's equally easy to stop them in any sequence, again with any time delay necessary.

Having introduced the time delay, let's take a look at him. He's another switch. There are several types. The simplest and cheapest is the bimetal variety. As soon as electricity reaches this type, it goes to a heater coil. This coil warms a bimetal strip. This bimetal strip, of two metals which expand at different speeds when heated, are fastened together at the ends. Heating causes the strip to bend,

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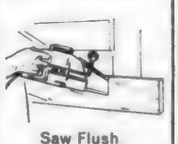

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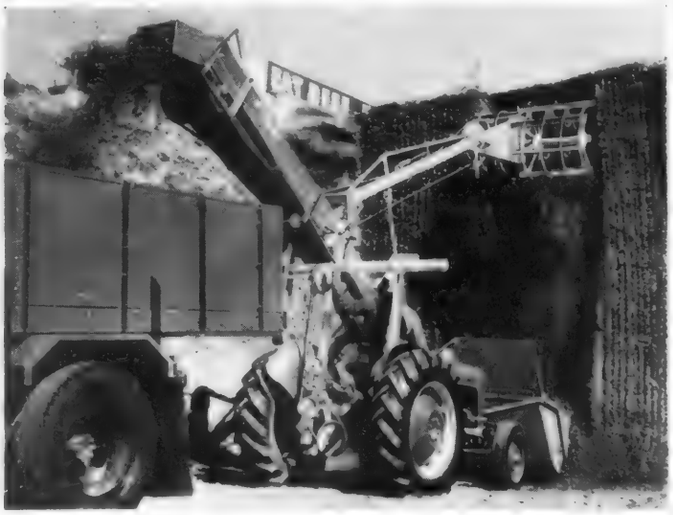

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the faster-expanding metal taking the outside of the curve. This movement closes the switch. They can be bought for various delays —two seconds up to three minutes or so. They're not too accurate—the time delay will vary slightly, depending on outside temperature, among other things, and may lose responsiveness with age. But they're relatively cheap—in the $3 to $5 class.

Other time switches are more accurate and more expensive. Some types can be adjusted to various time delays. One made by General Electric costs about $30, and works by an air delay. Actuating the switch powers a magnetic coil. This attracts a plunger, which closes the contacts. The plunger is delayed by a piston forcing air out of a cylinder. By adjusting the hole through which the air escapes, the time delay changes up to a maximum of around 15 minutes. Heinemann Electric Company, Trenton 2, New Jersey, makes a cheaper delay, the Silic-O-Netic, which uses oil to retard the plunger. It's not adjustable, comes from ¼ second to 120 seconds delay.

In the $15 to $40 class is the synchronous motor time delay. This is a motor of the type that powers electric clocks. It is extremely accurate, least subject to dirt, moisture and other ambient conditions. Accuracy can be obtained on very short ranges as well as range up to 24 hours and beyond.

The synchronous motor time delay can have an off or on delay function on interval. It runs for a preset time and then operates a switch. The cost of operation of this continously running synchronous motor? About a penny a week.

Time Controls

Although it may be common vernacular to call time controls "timeclocks" the term is really a misnomer. Howard Buchholz of Paragon Electric Company, Inc., explained, "Time controls are used to control automatically the "On-Off" operations of electrically powered apparatus. Time switches or timers each have their own specific advantages." A time switch is usually electrically operated—or uses a combination of electric and spring drive. It need be set only once. After that it operates day after day, without any attention, turning current "On" and "Off" at desired time of day or night.

A timer is similar to a time switch, except that it operates regardless of time of day. It measures the time elapsed before, during or after an operation, or the relationship between "ON" and "OFF" periods. There's the handset type—spring-driven— like the one found in kitchens, that rings a bell when the stew's cooked. In the control version, you set a pointer to the required time and it switches something off (or on) after the minutes have elapsed. It's powered by a spring. These are often standard equipment on small mills, exhaust fans, and electric ovens. They must be reset every time. They cost around $3 to $5.

For $30 to $45 you can get one electrically driven that automatically resets itself. It can be used to feed chickens for 15 minutes every hour, for instance.

Another of this type is the percentage timer, a control in the $15 range. This is set for the percentage of the time you want it on. It will stay on for 40 percent of the time, off 60 percent, or any other combination. Models can be bought for various intervals, that is, the cycle of 40 percent repeats every ten minutes, or every 24 hours.

When you get to the stage of operating something on a daily basis, you get to the timeclock. They vary widely in price, but the normal farm application is in the $15 to $40 range. For instance, Paragon Electric Company, Inc., Two Rivers, Wisconsin, makes a 7-day clock (one that can have individual and different programs for each day of the week) handling 40 amperes, operating four switches, for $33.50. The simplest will switch on once each day, off a set time later. The time it starts is adjustable, as is the length of time before it switches off. More complicated time switches have many refinements. They'll run for a week, allowing different setting each day. Some have a coil spring incorporated—this is a clock within the timer. One is made by Tork Time Controls, Inc., Mount Vernon, New York. If the electricity is somehow cut off, the spring keeps the timer's clock going. Thus a power failure doesn't alter the setting of the clock.

Multiple switch timers have infinite uses. They are widely used in poultry houses to feed at set intervals, control lights, and collect eggs mechanically. Banks use them in timelocks, which prevent vaults being opened at night. An Oklahoma company, Hobart Manufacturing Co. of Hobart, built an automatic stockfeeder incorporating an electric timer. It hoots a horn to call range animals to the feeder. Then, fifteen or twenty minutes afterwards, it doles out a fixed amount of feed to the waiting animals. The feeder costs around $500.

An Idaho farmer-manufacturer, J. W. Browning, sells a timer which drops a canvas irrigation dam after a preset time. The water is then released to flow to the next set without human control. Although this particular model is spring-powered, there's no reason why it couldn't be electrical. Another irrigation aid has been the float valve, installed at the end of an irrigation border. Floats can be set to close gates when the water has reached a chosen level at the bottom of a field. Even more futuristic is the irrigation control designed by the University of Nebraska, Frank Murphy, Inc., Tulsa, Oklahoma, and Radson Engineering Corporation, Macon, Illinois. A soil moisture tester in the middle of the field records soil moisture. When it falls below a given level, a radio transmitter signals a receiver on the irrigation pump. Switches are operated in a given sequence. The choke on the engine is pulled out, the shaft on the pump oiled. The starter is engaged, the throttle adjusted, all by controls. Then the sprinkler irrigation system pumps water over the field. If anything goes wrong, such as no water, no oil pressure, or if the engine won't start after a five-minute try, the system switches itself off. Incidentally, it could easily be made to ring a bell to warn of its malfunction.

The "Stats"

That little detour into the irrigation field really introduces a new kind of control, a switch that is operated by something other than a man or a timer. It is a control with a certain amount of judgment.

Simplest of this range of controls in the thermostat, the simplest form of which is a combination of a temperature sensitive device and a switch. Instead of showing the temperature, the thermometer throws the switch at a given heat level. The simplest thermostats use a bimetal strip to work a small mercury switch. Such a model costs about $15. More accurate and more expensive designs use liquids such as toluene in coils or bulbs, often remote from the switching apparatus. They begin at $20 for a common farm model, and go up to several hundreds of dollars. Others use thermisters —little beads of metals that change their electrical resistance with temperature changes. This change in resistance is measured, amplified and made to operate the thermostat.

The thermostat is the most ubiquitous of the automatic controls. The commonest use is to maintain a given temperature—as in

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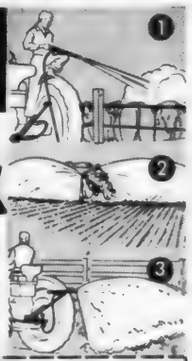

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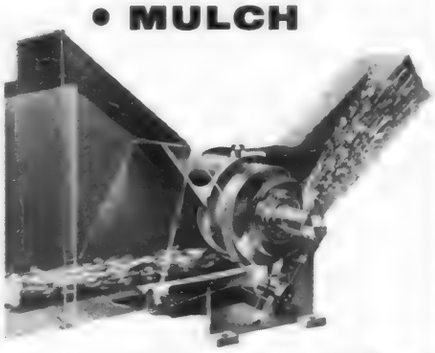

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a refrigerator or furnace. But it may also be a safety device—all furnaces have (or should have) a limiting thermostat on the output side of the heat source. If something goes wrong, the thermostat closes down the system; flame guards are thermostats of sorts, sensitive metal rods which control a flame in a burner by sensing the electronic changes of the rod and amplifying them, and controlling the flame by switches.

Partner to the thermostat is the humidistat—the couple often work together in ventilating and air-conditioning systems. The range of price is about the same. A common farm model costs around $20. The principle is the same for both, the difference is that the switch in the humidistat is actuated by a humidity-sensitive device. Many materials are sensitive to moisture in the air, but nylon and human hair are the two most commonly found in humidistats. More accurate and sensitive humidistats use electronic sensing devices—the equivalent of the thermisters of the thermostats. For humidity, one electronic senser uses goldleaf, painted with the rare metal, lithium. This treated goldleaf is spread in a grid on a small plastic plate. A tiny electric current passes through the grid, and this current fluctuates minutely with humidity. A sensitive electronic amplifier detects, and enlarges this current and can make it operate any equipment.

In the mechanical humidistats, the nylon or hair physically operates the switch, through a linkage perhaps, but by its own movement. The nylon lengthens as humidity increases, shortens as humidity decreases, operating a Micro-Switch. The electronic sensers, however, have no mechanical parts. They operate entirely by electrical change. They are correspondingly more sensitive, more accurate, and more expensive. And they respond more quickly to changes. A mechanical thermostat may react to a 2° F. change. The electronic would react to a change of less than ½° F.

The same is true of the humidistat—mechanical and electronic have different advantages. No humidistat will operate at temperatures above 125° to 150° F.

Low Voltage Circuits

The stats bring to the surface another facet of controls that we've carefully bypassed on all the gadgets till now. That is the low voltage control circuit.

Take the thermostat as an example. If it is mechanically operated, some expanding substance—bimetal or liquid—must push a switch. This requires some force. The bigger the switch, the bigger the force. Part of the answer is the Micro-Switch—a small, sensitive switch with a very tiny movement necessary to operate the actual switching gear. But these switches can't handle big voltages and currents. A heavy current would arc, burning out the switch after a very short life. So if you want to handle, say, the 7½-horsepower motor of a hay-drying fan with a thermostat you've got problems. One answer is the electronic thermostat—except these cost more than the fan would cost. So the practical answer is

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low voltage controls and relay systems.

This setup contains two completely separate circuits—the control circuit and the power circuit. The control circuit is low voltage—usually 24 volts, maybe less. It uses tiny currents—thousandths of an ampere. Because of this, the thermostat can be much more sensitive and accurate, because a tiny switch will control this tiny current. Hence a small change in temperature will provide enough movement in the thermostat to operate the switch. But this tiny current won't operate a 7½-hp fan. However, it will power the coil on a relay!

The thermostat's action is to actuate the magnetic coil in a relay. This opens or shuts any number of contacts, which can be connected to the power source necessary to drive the fan motor.

The thermostat and the humidistat are not the only controls that can use a low voltage circuit to good cause. Practically every other control can use low voltage many times with good effect and cost reduction. Thermostats, for instance, can be smaller and lighter and consequently cheaper, if the switching contacts don't have to carry powerline voltage and current. Or, for the same price, the thermostat can be more accurate.

Wiring costs are cut, too. Many remote switches can be installed to handle a motor from many separate locations when the wire costs a penny a yard instead of some 10 cents a foot.

Of course, there are extra costs to the low voltage system, and these make it pay off only when relative large lengths of wiring can be saved, or where accuracy is essential. As an example, in the simple fan and thermostat system, with a thermostat switching the powerline current, all that is needed is the thermostat and the fan and wire to a manual switch to control the whole setup. If the switch is a few feet from the powerline anyway, nothing could be better.

In the low voltage system you need the same powerline to the fan, incorporating a magnetic motor starter. The low voltage circuit is separate, connecting only to the motor starter. This separate circuit contains the thermostat, which operates the coil on the motor starter. Also in the low voltage line will be a manual switch for overall control; and a transformer, as a source of low voltage power. This last is a five-dollar item usually. You could hardly justify the extra cost for the low voltage system *unless* you wanted to have the thermostat, or the controlling switch (the one at low voltage), some distance from the fan. (The fan must be visible from the location of the control switch, for safety.

There's little doubt that the low voltage system is going to spread widely into farming as we approach the push-button era. (And we're not there yet no matter what city magazines and newspapers would have you believe.) Complicated controls almost demand a low voltage circuit. It's cheap, it can be wired safely, and far more controls become possible. For instance, a feeding system might need three or four augers to fill

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a line of hog self-feeders, and a couple more to operate a small mill and the augers to feed the mill with corn. At low voltage you could add a monitor board to show which motor was on, float switches in each feeder to indicate when they were empty, and a horn to sound off if a blockage occurs.

The audible warning is just catching on in the farm field. Minneapolis-Honeywell sells for about $100, a frost warning. In the words of Charles Sweatt, dynamic, unruly-haired head of their agricultural controls division: "A Georgia orchardist is worried about the frost; O.K., we sell him a little thermostat, he sets it in his orchard. When the temperature hits 35 it rings a bell and he jumps out of bed and lights the smudgepots. He pushes a button and the bell quits, but the light stays on as long as it's below 35°. When the temperature rises the light goes off and the control resets itself."

Light-controlled systems are pretty new in farming, but several have already been introduced. Com-Pak-Ett Mfgr. Co., of Allegan, Michigan, has a line of equipment operated by a photoelectric cell. For $35 to $100, depending on size, you can buy a photoelectrically controlled barnyard light. It'll switch on at dusk, and off again in the morning. Several electrical companies sell small photocells for controlling house and porch lights. They cost around $10 and handle up to 300 watts. They're useful when you are away from the house, but suffer from the disadvantage that a good moonlight night often switches off the light, and a thundercloud overhead may switch them on. (Tork has a combination photocell and time control to prevent this—but it costs $39.95.) Paragon has a time control internally geared to adjust automatically to the seasons of the year—it doesn't depend on a photocell. It goes on and off at sunset and dawn all year around.

The photocell makes a good counting device. A beam of light is shone on the cell, and when it is interrupted the cell signals a magnetic coil, which triggers a counter like the milometer on an automobile. You could count the bales of hay going up an elevator or the eggs passing on a conveyor. The A & K Farm Supply Company, Minneapolis 16, Minnesota, uses a photoelectric cell to spray cattle. They walk under an arch, interrupt a photo beam, and this actuates a fly spray until they are out of the beam. If the cow stays in the spray, it automatically cuts off after a few seconds, till the next cow nudges her out.

Three cardinal rules of putting together a control system are:

Don't buy cheap equipment
Use adequate wiring for all motors
Design a system to be fail-safe.

The fail-safe angle is one of the beauties of electrical controls, because it is relatively simple to design the fail-safe mechanism.

Fail-safe means simply that the system stops if any part fails, and the failure of any part cannot start up the system. The magnetic motor starter is a simple example—if the electricity supply to the magnetic holding coil fails, the motor stops as the contact to the power supply is broken. Another fail-safe device is the thermostat now installed on all gas and oil-fired furnaces. This bimetal strip touches the pilot flame, and holds open the main fuel supply valve. If the pilot should blow out, the bimetal cools, closing the fuel supply down when the pilot is out.

Mercury switches, alarm bells and many other controls can be made fail-safe with a little ingenuity. One excellent fail-safe device is one which opens a switch, which must be manually reset, after a power failure. Then no one touching equipment can be injured if the power is suddenly restored.

Fuse and control boxes should be equipped with a door switch so all power is disconnected when the door is opened. It may pay to put a similar switch on the safety covers of augers, belt or gear drives and other dangerous places, so that if they are removed when the system is working the power is cut off, and the motors stop. Of course it's possible to override such safety switches, just as you can put out the refrigerator light by pushing the button inside the door, but it's foolhardy. Hoyle Puckett summed it up. "You can make a system reasonably safe, but you can't make it idiot-proof."

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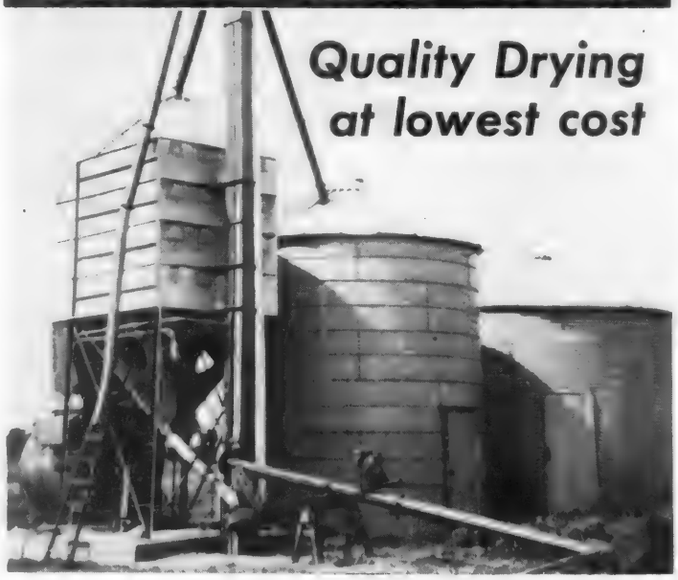

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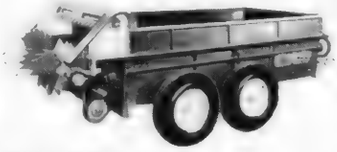

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SLATTED FLOORS

(*Continued from page* 26)

crown on top. They *must not* be concave. Easiest way to get this—slightly overfill the forms and press down the edges with a float. However, some forms have been built with round bottoms. The slat is poured upside down, and the sides of the form removed to release the finished slat. High quality concrete is essential, and no cracks must appear. The "tension cracks" on the underside allow acids to rust the reinforcing rods.

MANURE DISPOSAL. The simplest method is to remove the slats once a year and scoop the manure out with a tractor shovel or blade. In Europe slats have been built 8 to 9 ft. high, and the manure cleaned out by tractor and scoop. (This job isn't popular.) Mechanical scrapers save labor, but cost considerably more—around $1 per sq. ft. to install. The manure lagoon under the floor, with a pump to empty it periodically, cuts labor down, but no one knows the effect of the humidity, or what diseases may do with a lagoon so near the animals.

The University of Illinois is building a compromise—a subfloor sloping ½″ in 12″ to a center drain. The pit is lined with 6-mil plastic and will hold a few inches of water. The center drain runs the length of the 24′ x 64′ building. They hope to let manure accumulate, then pull a plug and let manure and water flow to an outside lagoon. How often these flushings will be needed isn't yet known. The floor is 12′ above the plastic liner.

A Missouri farm, Landhamp Ranch at Joplin, has a slatted floor 36″ above a dirt floor. The ground underneath is liberally seeded with earthworms which, claims the owner, make a self-digesting, continually operating unit. This has been in operation for nearly 3 years with no cleaning at all, and it stays free of smells and flies.

Whatever form of underfloor is used, it *must* be sealed: first, from drafts for animals' comfort, and second, to make the underfloor atmosphere unsuitable for breeding of flies.

CORROSION AND RUST

(*Continued from page* 42)

the iron pipe from dissimilar metals in the plumbing system, such as copper coils of a water heater. Number 10 or larger "jumper" wires should connect the outside of the pipes to insure safe electrical grounding. Sacrificial magnesium anodes are made for installation in water tanks. They cost a few dollars and usually last two years. Inhibitor feeders, such as Calgon's Micromet Feeder, are placed close to the water source where they automatically meter out inhibitors such as polyphosphate or sodium silicate. Feeders may add amounts as little as 2 to 10 parts per million. They cost about $30. Aluminum irrigation pipe will begin to corrode if connected directly to iron pipes or pumps without a dielectric union. Water may cause corrosion in aluminum pipe if it has previously been carried by iron pipe.

LOW COST GRAIN HANDLING

(*Continued from page* 138)

bottom of the vertical auger. We had to point blind, cut a hole in the bin wall, and more or less hope it was in the right spot. A neighbor said we could have done a better job with a 30-30 rifle—just point at the bin cap and blast through the wall."

They missed a little way on one bin—which was the cause, indirectly, of Sink's major complaint. McKenzie had intended the vertical auger to tilt only in one direction towards the farthest bin. The nearby bin was to be fed by gravity. The slight error in placing the bin augers made it necessary to tilt the upright auger to fill either bin, and, said Sink, "It's a lot of trouble to handle the vertical screw. Other than that I wouldn't change a thing."

As the upright screw is tilted—by letting out rope through the pulley on the supporting pole—Sink has to prevent it from swinging with another rope tie. As the auger leans at wide angle

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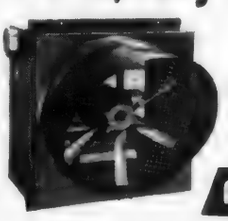

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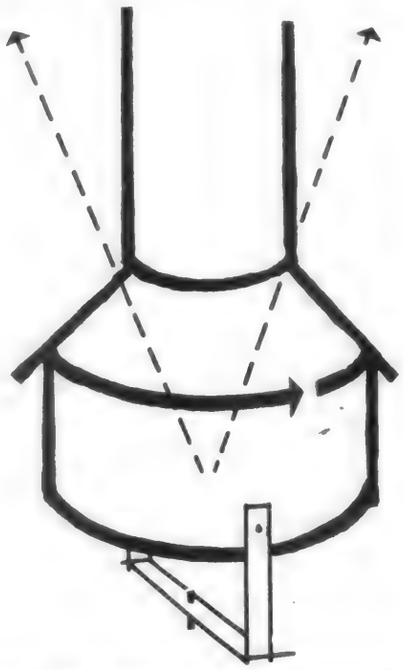
from the pole it gets unwieldy. It is a heavy auger with a three-horse electric motor at the top adding to the unmanageable weight. Handling it is a two-man job.



The oarlock device supporting the vertical auger is hinged so the auger can tilt from side to side, or rotate around the center pin. The large diameter base and the auger force-feeds the rest of the screw.

McKenzie, seeing the facility in operation, sat down to figure a way to overcome this, and suggested a double pole support, which Sink wants to try. It will make handling the auger a one-man operation.

The layout was built during corn harvest last year. "I'd work on it until the ground was fit to go into the field to pick," said Sink. "Then I'd come back at night and work some more. But I wish we'd poured some concrete—we lost some corn we needn't have. But we didn't go straight to the center building, because I was so busy at harvest. We didn't miss the building except when the wind was bad, and the auger would get to blowing around." All the electrical switches and controls are on a covered panel set so it will fit on the barn wall.

Costs for the Lugar-Sink facility are lower per bushel now than at the Hadley-Siebrase farm, because of the absence of the center building. They'll be slightly higher for the completed structure because of the better quality and higher capacity augers.

Comparisons of retail costs are:

Sink:

4,300 bu. bin, fan, heater, and drying floor	$2,591.06
7,200 bu. bin	2,000.00
20′ vertical force-fed auger	161.75
16′ auger (6″) and hopper	140.00
20′ auger (6″) and hopper	160.00
Unloading augers, sweep auger, grain tester, motors, wiring, etc.	2,521.71
Total	$7,574.52
Cost per bushel of storage	$ .66

Siebrase:

Center building including hoppers (Including $627 labor)	$1,732.00
Two 2,200 bu. bins and drying floor	2,184.00
Vertical auger	270.00
Burr mill	340.00
Batch mixer	280.00
*(Bought used for $130 plus motor $150)	
Footings, labor, misc. equipment, approximately	3,150.00
Other equipment	895.00
Fan and heater	642.00
Approximate total	$10,000.00
Cost per bushel of storage now:	2.27
Approximate cost of 10,000 bu. more storage space	4,000.00
Approximate final cost per bushel storage	.70

The cost of the three facilities—Chapman's original one and the two newer layouts—depends on the choice of equipment, as well as the amount of used equipment bought, and farm labor used. In all of them planning is substituted for dollars. Chapman has a $700-bucket elevator, with a one-hp motor and about 750-bushel per hour capacity. Sink has the same capacity in a vertical auger but it takes a three-hp motor to get it. Siebrase has about half the capacity in a vertical auger with a one-hp motor. The switch on his sweep-gathering auger means he can dump and forget a load of corn—both Chapman and Sink have to wait with incoming loads until the grain is elevated. With their larger capacity, this takes less time. It's all a question, as McKenzie says, of applying equipment or planning. Take your pick.

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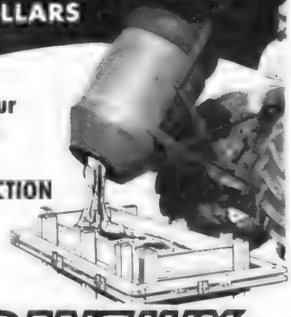

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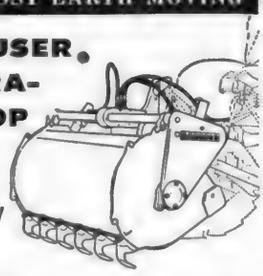

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THE LAST WORD

Flat Out at 14 mph

When I was a kid, and an orange box was a treasure, with baby-carriage wheels as prized as gold, we used to build wheeled buggies, ride them down the street and yell: *Two wheels and a board make a swell little Ford guaranteed to go if you push it.*

Today, it seems, two wheels and a frame make a good 14 miles per hour (if you're pushing the three-hp engine) on a go-anywhere, off-the-road motorcycle made in Denver and sold by the SideKick Sales Co., 5958 North Washington. The SideKick is a rugged scooter which will carry 400 pounds, take rough country in its stride (or under its 9½-inch clearance), and detachable handlebars maks it easy to tote in a station wagon or jeep. Or you might haul it on the back of a tractor to get you home for lunch. There's even a buddy seat.

The transmission is chains and pulleys, with a couple of variable pitch pulleys and a V-belt giving completely variable speeds up to the 14 and 15 mph peak, and allowing full power at any speed. It's three horsepower, three hundred and twenty-five bucks, comes with a spare gas can, luggage rack and footrests.

My orange box seems pale by comparison.

New Association

The Beefmaster is no longer a one-man breed. Actually it has been quite a while since the Brahman-Hereford-Shorthorn cross could be considered the sole property of developer Tom Lasater. Nevertheless, when Beefmaster is mentioned, cattlemen immediately think of Lasater and his big, multi-colored cattle.

Now the Beefmaster breeders around the country have gotten together and formed their own association, Beefmaster Breeders Universal, with headquarters at San Antonio, Texas.

The new organization will seek to promote and to continue the development of the Beefmaster breed under the six essential characteristics stressed by Tom Lasater: disposition, fertility, weight, conformation, hardiness and milk production. (See The Farm Quarterly, Winter, 1956, page 32.)

Co-op Packing

As mentioned in the article, "Hogs on the Wire" (page 70), Charles W. McInnis, former president of the Ontario Hog Producers Co-operative, has little sympathy for selling hogs by teletype. Since his departure from the OHPC he has been busy organizing FAME (Farmers Allied Meat Enterprises Co-operative, Limited). This co-operative meatpacking enterprise is his answer to the farmers' marketing problems, and a might ambitious answer at that.

In addition to his objection to the auction method of selling, McInnis presents this analysis of the farmer's marketing situation.

"Our Canadian farmers, like you Americans," he says, "are getting an ever-dwindling share of the consumer's dollar. The reason for this is the pressure by the country buyer, by the processor, by the wholesaler and by the retailer."

McInnis feels the farmer has lost his power over marketing live animals. "Therefore," he concludes, "we are forced to enter the processing field to establish a countervailing power and eliminate the pressure at the first three points.

"The most important points of a program of this kind are (1) it must serve all livestock producers; (2) it must operate in a big way; and (3) we must have new plants and facilities."

By "serving all livestock producers" McInnis means just that. He is not talking about only the hog producers or the cattle people or the lamb producers, or only ten or fifteen percent of all these combined. He intends to have FAME process the production of all of them. And when he says he is going in in a big way he makes no qualifications there, either. "We contemplate a chain of slaughtering and processing plants located to keep transportation costs at a minimum. And those plants will be strictly modern in their layout and equipment to put us in a strong competitive position."

But can the Ontario farmers, or any farmers, for that matter, afford this kind of enterprise?

"They can't afford not to. Ontario farmers have $18 invested in livestock and buildings for every $1 of capital stock of the meatpacking companies," McInnis says, launching into statistics. "If these same producers will set aside only one cent from every dollar of livestock sales, they will raise two and a half million dollars annually. This is certainly enough to finance FAME."

The FAME Co-op ran into some obstacles in the Canadian Securities Act when it started selling its debentures last fall. This technicality having been ironed out, the organization has been conducting a new fund drive. If all goes well, McInnis points to mid-1962 as the date when FAME will start processing. This may be interesting to watch.

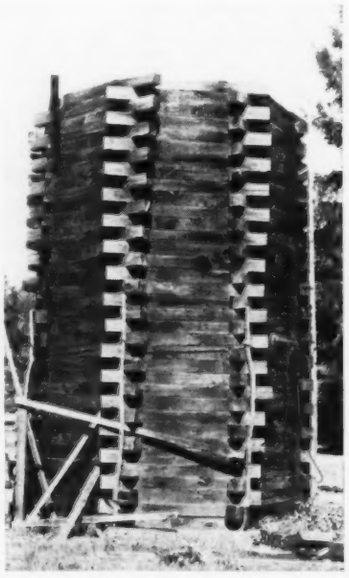
Up and Down Gate

A New York farmer, Henry Schloer, of Greene, designed a gate to overcome the problems of opening a gate with snow on the ground, to prevent post leaning, and to cut down the time it takes to open the gate. He came up with the Coventry gate (he lives on Coventry Road) which opens by swinging up like the gate at a railroad crossing. To raise it you lift the spring-loaded aluminum frame and it rises to almost vertical and locks in this open position. To close it you release the lock with a lever, and guide the gate back to its two catches on the opposite post.

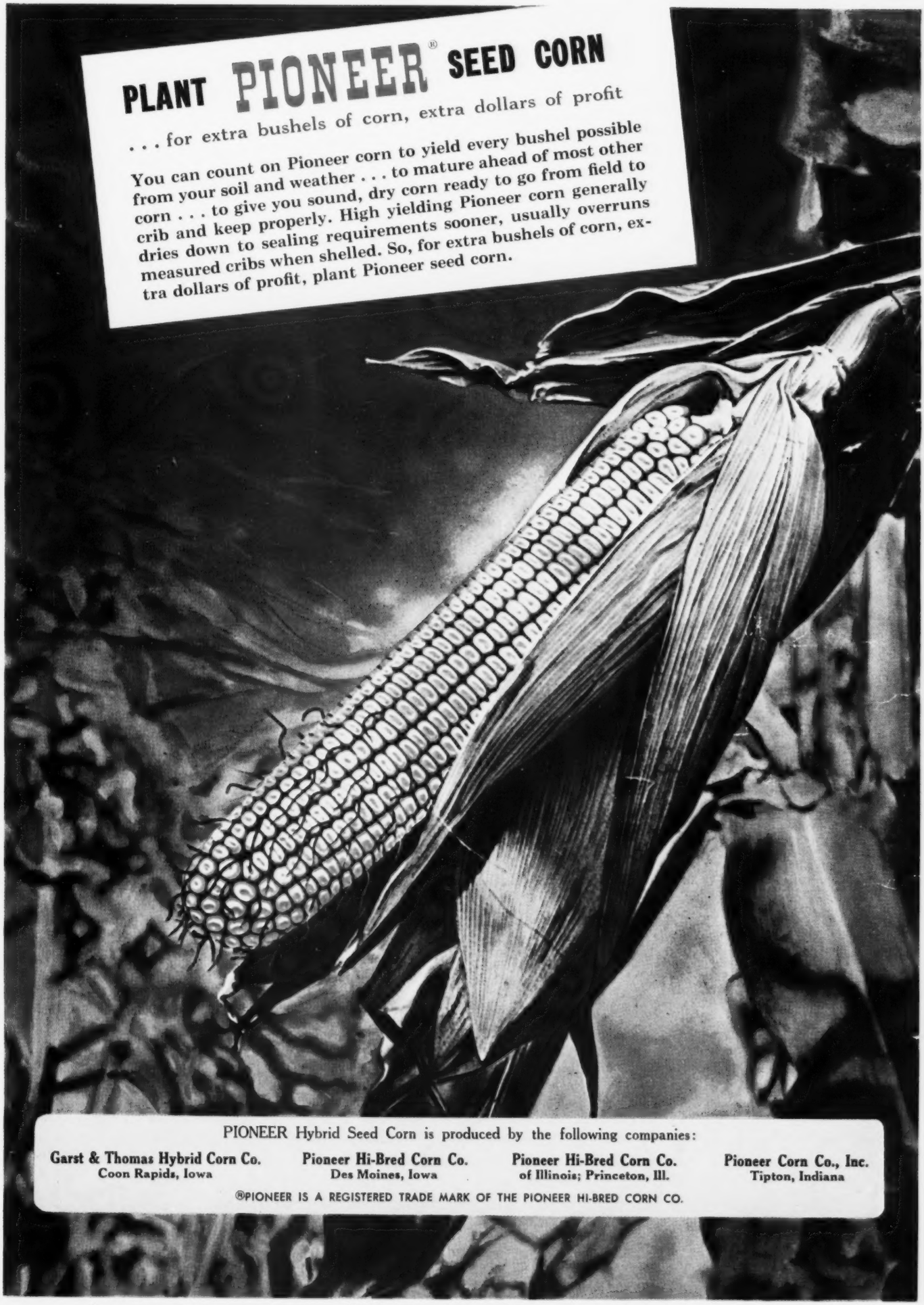
"You can mount the gate close to the ground, close to the steepest road, close to a building, and you can open and close it from horseback," said Schloer.

The gates cost $98.50 each, $90.00 for four or more, ordered from The Henlon Corporation, Vestal, N. Y.

Tie Silo



We've seen grain storage structures made from overage boxcars, and a friend of ours built a six-room house that will last forever out of beams salvaged from an abandoned railroad bridge. Now, we can show you an octagonal silo built for the ages from old railroad ties. This odd structure stands on the L. L. Larson farm in the upper Satsop Valley, near Montesano, Washington. It took 300 ties to do the job and it stands 27 feet high. No one ever measured its capacity; our guess is that it held around 25 tons of silage. Like many wooden silos, it is no longer in use, but during its active life it paid its way and earned retirement. With such solid sides, we still wonder how they pitched the silage out when it was near empty.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